Notebook Series -- Notebooks by Edison and Other Experimenters
Recorder and Recording Experiments -- Miscellaneous Books
Notebook, N-19-01-10.2

This notebook was used by Edison and Walter H. Miller in 1919-1920 for notes on experimental recordings. Some of the experiments took place at the Columbia Street studio in West Orange; others were performed at the Edison company's New York studio. The early entries include substantial comments by Edison. The later entries are all written by Miller, with occasional notations regarding Edison's opinions. Some of the experiments involved the use of a 40-foot horn. Inserted into the book are numerous loose pages of comments by Edison, some of which are summarized by Miller in the book. Most of Edison's notes indicate the page of the notebook to which he is referring. These notes appear on the microfilm immediately following the page to which they are keyed. In addition, there are six loose pages of notes by Miller, which refer to six experiments (#823-#828) at the beginning of the book. These notes appear on the microfilm immediately following the relevant notebook page. The book contains 144 numbered pages, some of which are blank. Several pages were removed from the front of the book prior to pagination.

Please return this
book to

Walter H Miller
Edison Laboratory
Orange
N J.

Long horn taper $\frac{17}{32}$ to foot

New End piece for Reg was $\frac{14}{16}$ to foot
" " " for 5/8 Reamer $\frac{12}{16}$ to foot

1) Horns used Exper #826

Experiment 826 Columbia Studio.

826-a

Violin — If we call 1 ft 100 loud

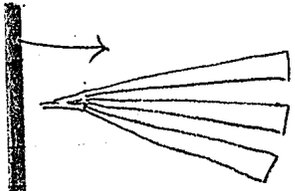
1 ft is about 1/3rd as loud as we need to get it showing a very insensitive recorder — its should be twice as loud

2 ft	75
3	65
4	60
5	59
6	59
7	59
8	58
9	57
10	57

826-B

Harp — Has bad blubb or jump or flutter on one baise not — its 1/2 the strength it should be for regular work

1 ft	100%
2	85
3	80
4	78
5	74
6	72
7	70
8	70
9	70
10	70



Columbia Studio

played to this horn only (5" x 60")

826-C

flute

1	100
2	75
3	60
4	50
5	45
6	45
7	43
8	40
9	36
10	32

has 1/2 Vol it should have —

My Ear not good for high notes

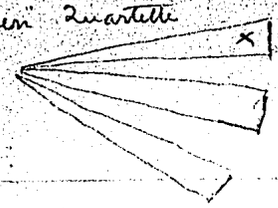
826-D

Cello

1 ft	100
2	75
3	70
4	68
5	65
6	63
7	60
8	57
9	55
10	52

only 1/2 loud enough

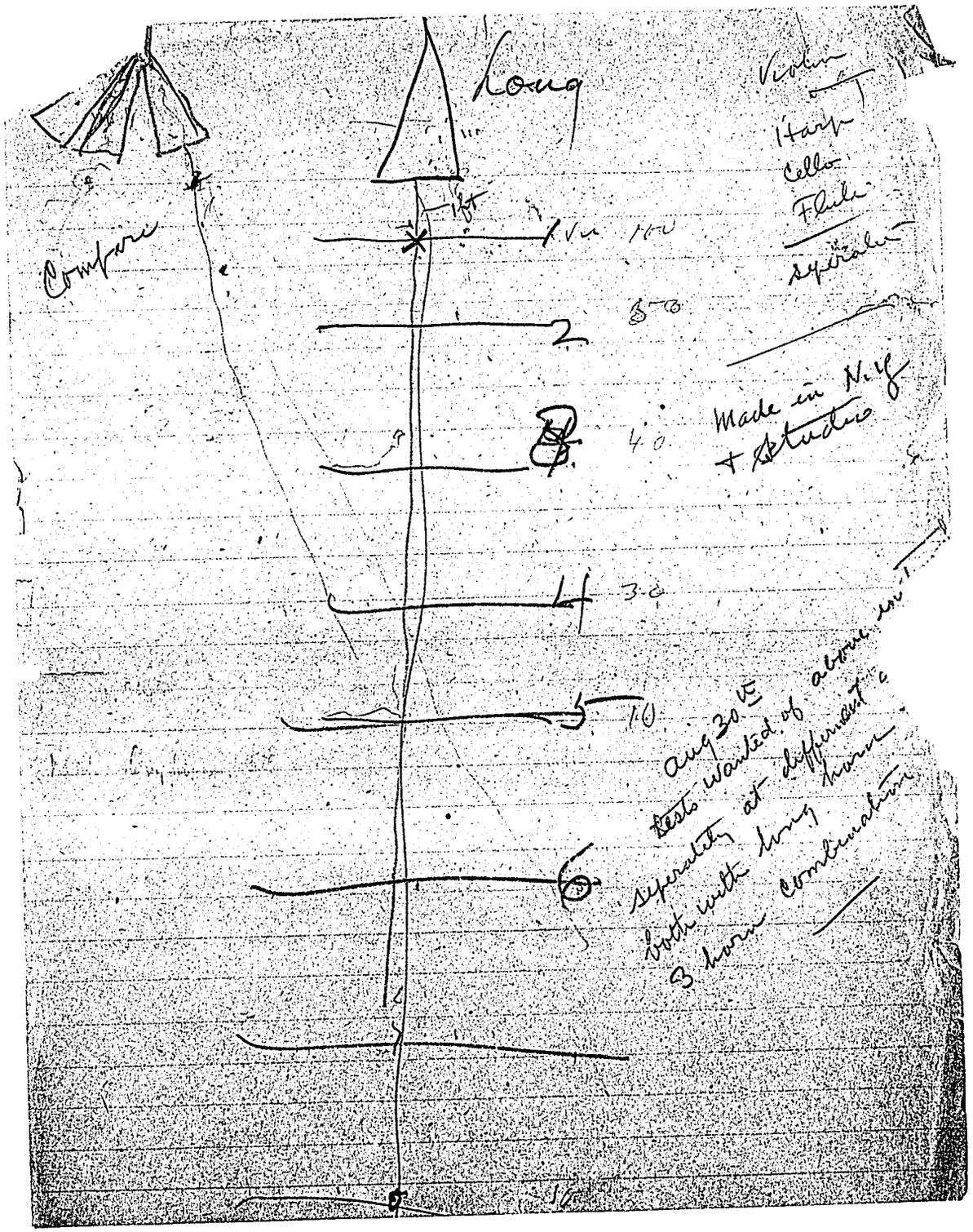
Horn use for
Vio Quartette



Record tests of Violin, flute, Cello Harp
in x horn, each seperately at Col studio

Ex ✓ 826 ✓ ✓ ✓

826-A	826B	826C	826 D
Violin	Harp	flute	Cello

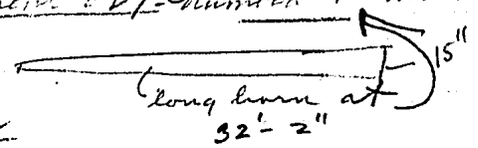

Long
Compare
Violin
Harp
Cello
Flute
Speaker
Made in N.Y.
+ Studio
Aug 30 ⅟
Tests wanted of above sev
separately at different
both with long horn
3 horn combination

Make living room an Studio - all instruments
" 3 horns in " all "
" 1 Violin in " " "

N. Y.

Make Violin in long horn 12" bell
" " in Short " 12" bell
" " " " " living room
" " " long " " "

Experiment 827-Columbia 4 Studio



827-A
Violin

1 ft.	Loud enough	100
2	"	90
3	not loud enough	80
4		70
5		65
6		62
7		60
8		57
9		55
10		52

827-B
Harp

1 ft	Loud enough for Reg	
2	"	
3	"	
4	"	
5	"	
6	75	
7	72	
8	70	
9	68	
10	65	

Due note blasts, flutter

for Orchestra 4 to 6 ft away will be loud enough & for solo as noted.

827-C
Flute

1 ft	Loud enough
2	not loud enough
3	60
4	57
5	55

Rest about equal & also great after 1 ft. He doesn't play with same volume each time

827-D
Cello

1 ft	for solo Loud Enough
2	"
3	70
4	65
5	62
6	60
7	59
8	59
9	58
10	58

Long Horn Col. Studio

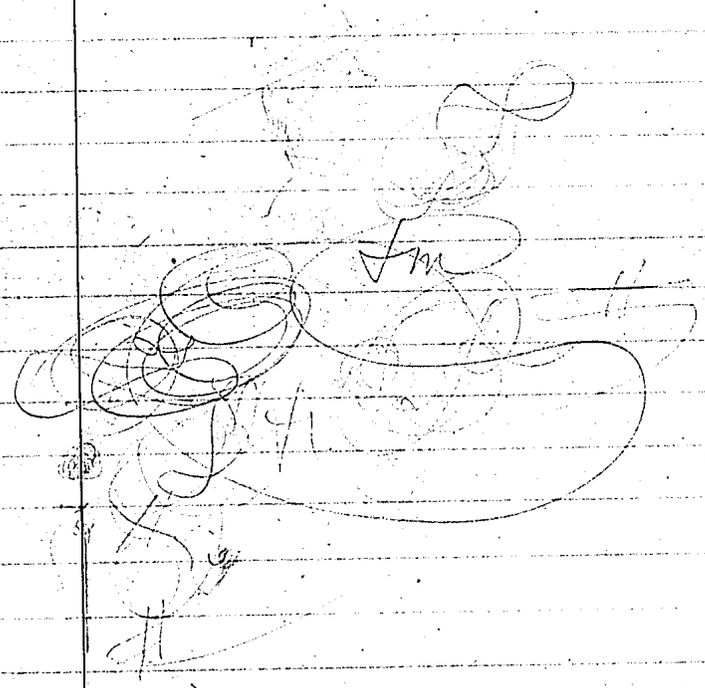
Alia #68

1 2 3 4 5 6 7 8 9 10

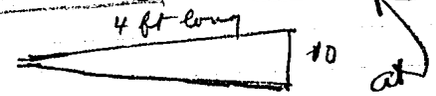
Record tests of Violin, Flute Cello, Harp with above horn at Columbia studio at different distances - each separately

Ex 827

827-A	827-B	827-C	827 D
Violin	Harp	Flute	Cello



Experiment 828 - Columbia at Studio



828.a
Violin

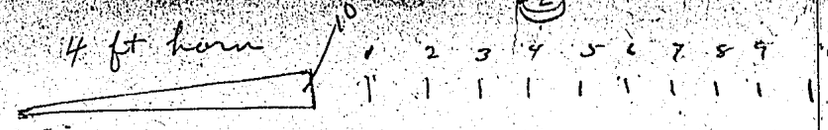
1 ft	Loud Enough
2	80 %
3	70 %
4	60.
5 —	50% of original Vol

828-B
Harp.

828-c
flute

828-D
Cello

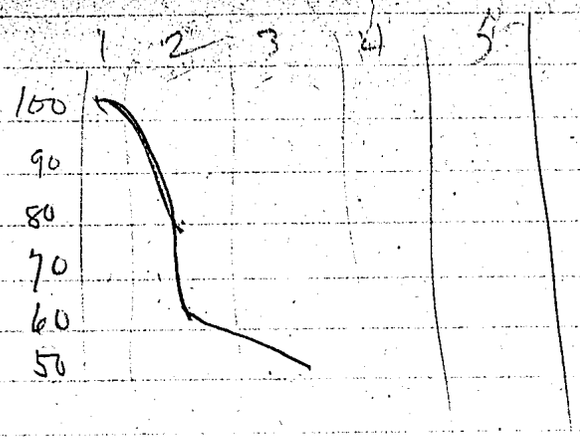
Walter = The 3 horns are very weak —
Long Horn loudest,
Short Single horn
not so loud as big horn
No room or hollow sounds
Quality same far away as it is close



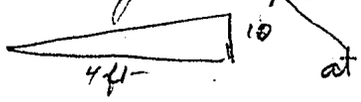
Record tests of Violin, flute Cello + Harp with above horn at Col Studio at different distances
- Will show comparisons of long + short horns

Ex 828

828-A	828-B	828-C	828-D
Violin	Harp	Flute	Cello


1
2
3
4
5
100
90
80
70
60
50

Experiment 843 - N.Y. Studio Padded



843-A
Violin

1 ft	Loud enough for Solo
2	" "
3	75
4	60
5	50% of loudness

843-B
Harp

1 ft	Loud Enough for Solo
2	"
3	"
4	"
5	nearly

Very little change in
Vol further on
But the bottom on
Base notes very bad
not one note like orange but
nearest each band

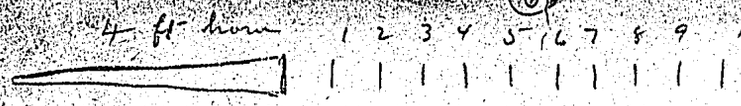
843-C
flute

1 ft	not quite loud enough for Solo
2	60%
3	50

843-D
Cello

1 ft	Loud Enough for Solo
2	not quite loud Enough
3	75
4	70

(6)



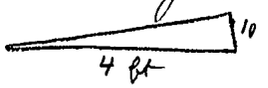
Record tests of above horn of Violin, Flute Cello + Harp, separately at different distances at N. Y. Studio, Padded room comparing both studio with the same horn.

#823

823 A	823-B	823-C	823 D
Violin	Harp	Flute	Cello

Empty room

Experiment 8rd N.Y. Studio



at

8rd-A
Violin

Better.
Barrel-
Room seconds
Bad

8rd-B
Harp-

Direction wrong
interference
Sts not clear

8rd-C
Flute

Is this mean down in a
well — outside of Chur.
Reminds there is a quarter
or other bad things

8rd-D
Cello

This is better
1 ft — a least right for Cello
2 drapes bad 65%
3 50%
Dont sound right

(5) Oct 1.8

4 ft horn 1 2 3 4 5 6 7 8 9 10

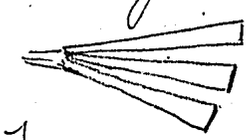
Record tests of Violin, flute, Cello Harp, with above horn each instrument - seperatly at different distances in an Empty room in N. Y studio

824

824 A	824-B	824 C	824 D
Violin	Harp	Flute	Cello

Experiment 835 N.Y. Studio

Same exper. as 826, but recorded in



835-A
Violin
1 ft in — too weak for solo
thin —
Drops quick

835-B
Harp
1 ft — Strong Enough
beat something [illegible]
with Quality [illegible]
bad —

Quality of
none of instruments
very good —

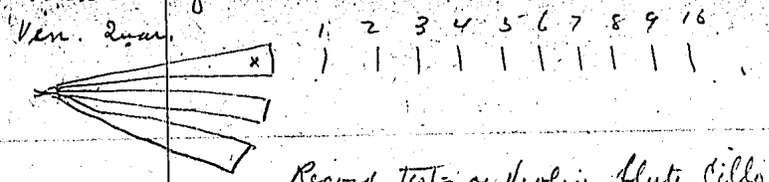
835-C
flute
1 ft — not strong Enough
2 — 60%

835-D
Cello
1 ft — not quite strong enough for Solo
2 — 80%

Horn used for
Ven. Quar.

4

Dia #18

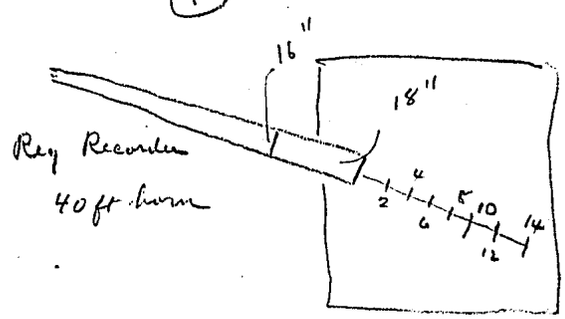


Record tests of Violin, flute, Cello, Harp in x horn
each separately at N. Y. Studio

Ex 825

825-A	825B	825C	825-D
Violin	Harp	flute	Cello

(1)



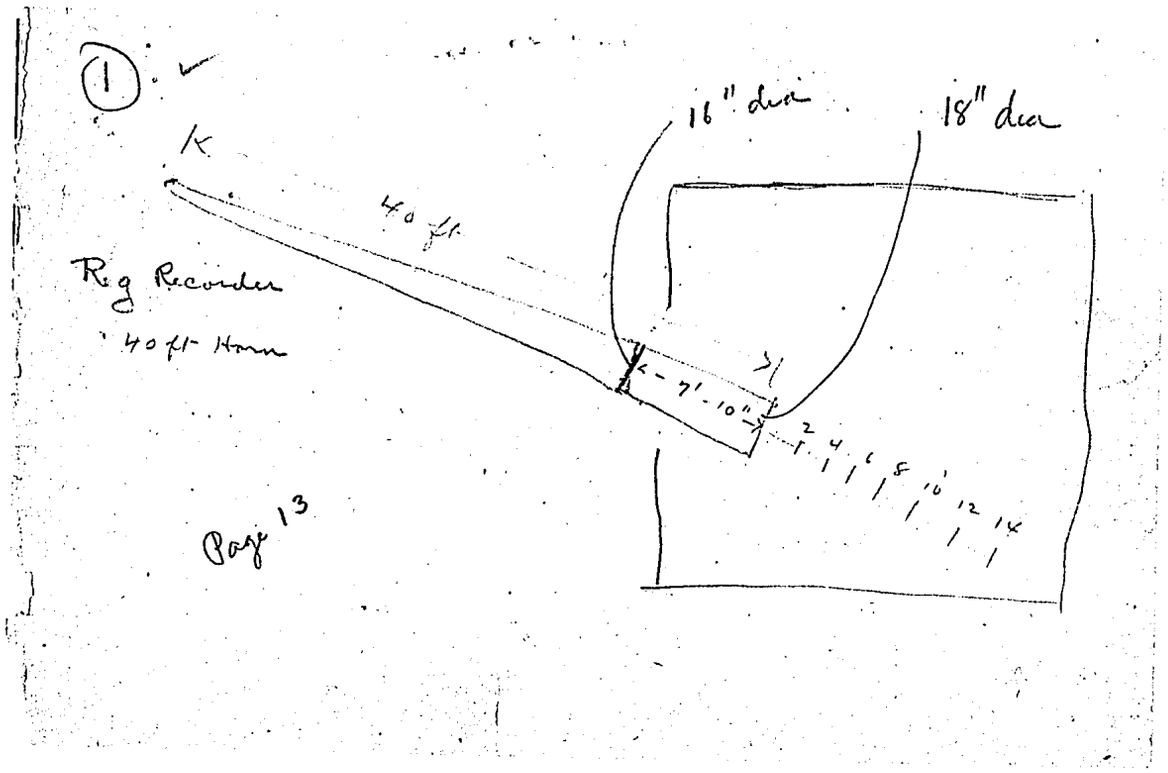
#1
2 ft - about same loudness as Reg Phone
4 ft - Loud enough 75% of
2 ft - better quality -
6 ft 50% of Volumn as #2 ft -
8 - 40%
10 38%
12 37%

No 1 =

2 ft about same loudness as Reg phone
4 ft - Local Enough - 75% of
2 ft — better quality —
6 — 50% of Volume as # 2 ft

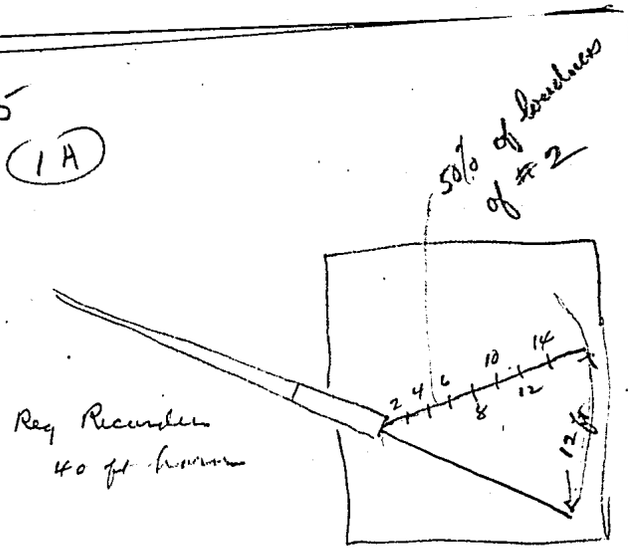
8 40%
10 38%
12 37%

Quality good
Base good


1
K
40 ft
Reg Recorder
40 ft Horn
16" dia
18" dia
7'-10"
2
4
6
8
10
12
14
Page 13

15

(1 A)



16

(1 A)

2 ft away 50% of 2 ft on No 1

4 - Weak

6 Very Weak

8 can just hear

1 A —

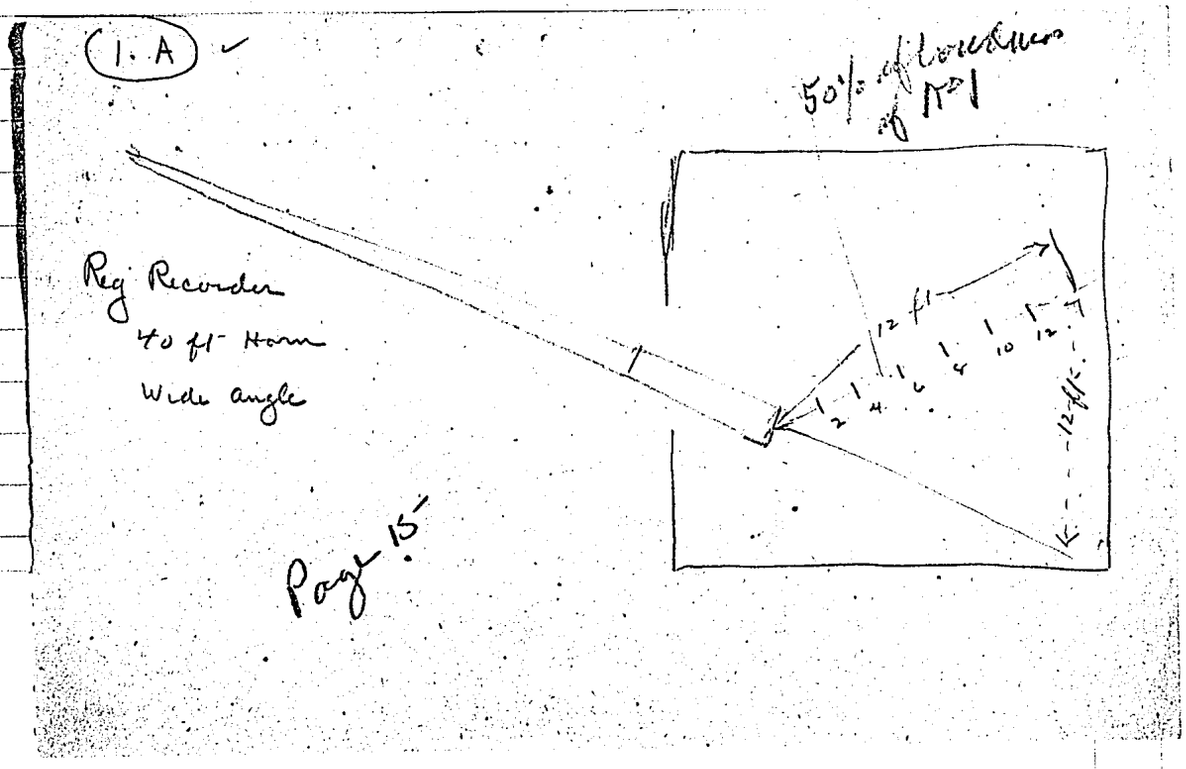
2 ft, only 50% of 2ft on No 1

4 weak —

6 Very weak

8 Congenital lesion —

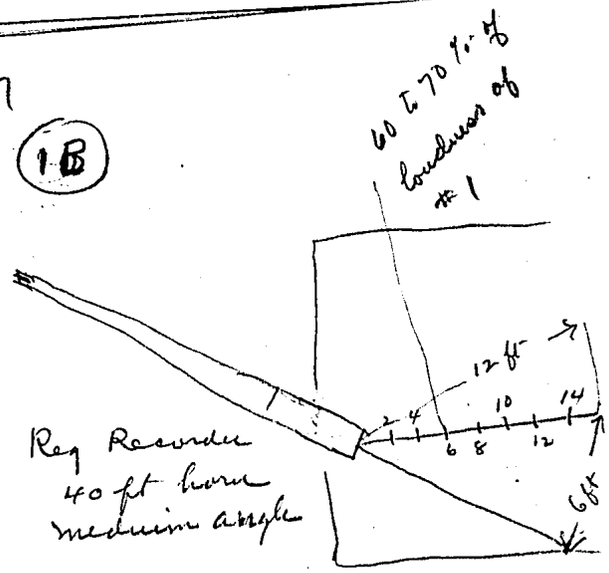
(1. A) ✓



Page 15

17

(1B)



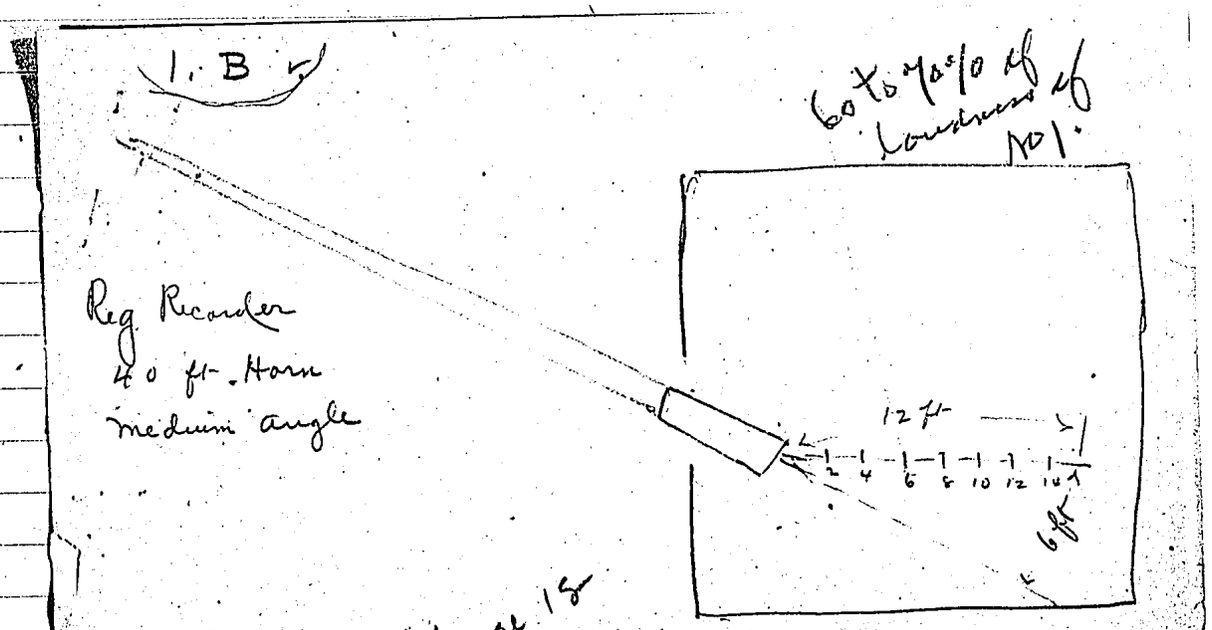
18

(1B)

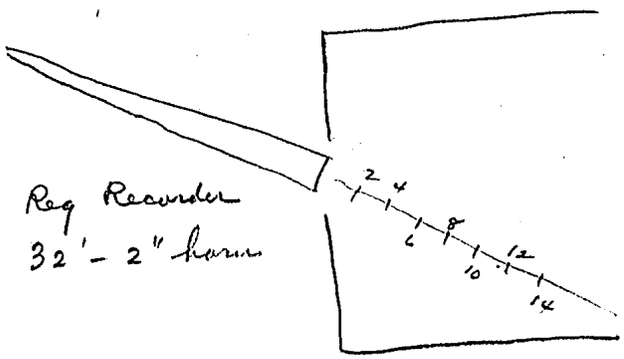
2 ft about 65 to 70% of 1A

Rest in proportion louder than 1A
Not near as loud as #1

1B -
2 ft about 60 to 70% of
1A - Rest unprepared
Louder than 1A not
near as loud as
No 1



1 C.

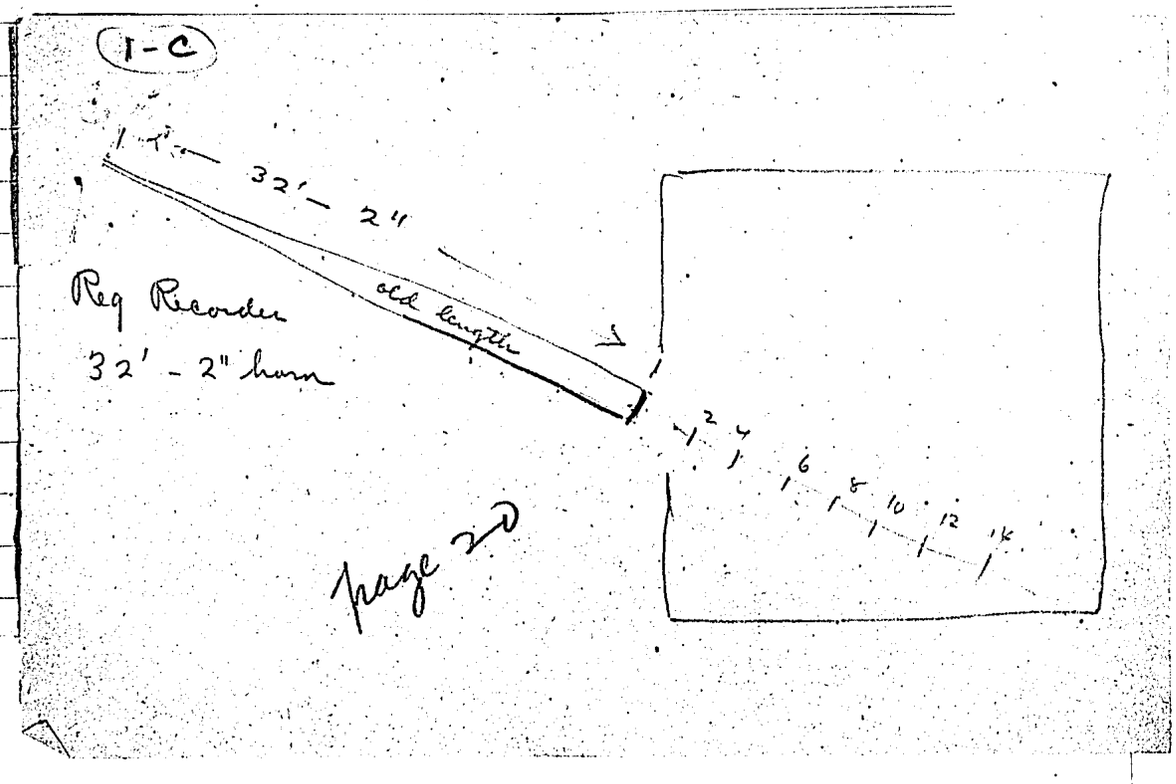


1.C.

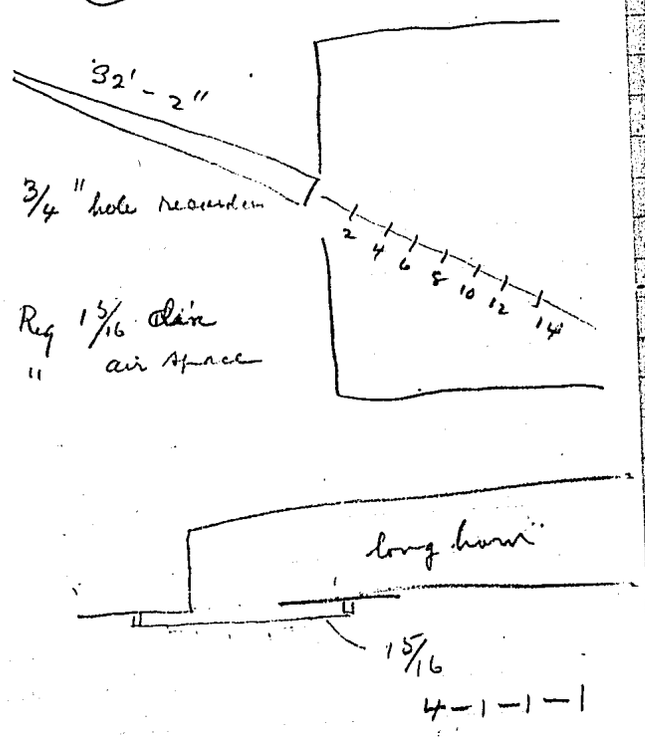
This is not as loud or good as # 1, but should say 85% of # 1 — quality — dont seem so good

1 C =

This is not as loud or good as ~~#~~ 101 - anywhere but should say 85% of #1 - quickly don't seem so good



(2)



(2)

This is much louder than any so far
But diaphram is not held up and controlled by air space enough and quality is like a cylinder phone with a very short funnel, sharp timbre, at 8 ft it is surpresingly loud

There is too much opening hence to keep this opening to get loudness you must have either a smaller chamber, so air will controll diaphram better, or increase diameter of diaphram to get more air cushing

This is a good line of experiment as loudness is satisfactory only want quality

No 2

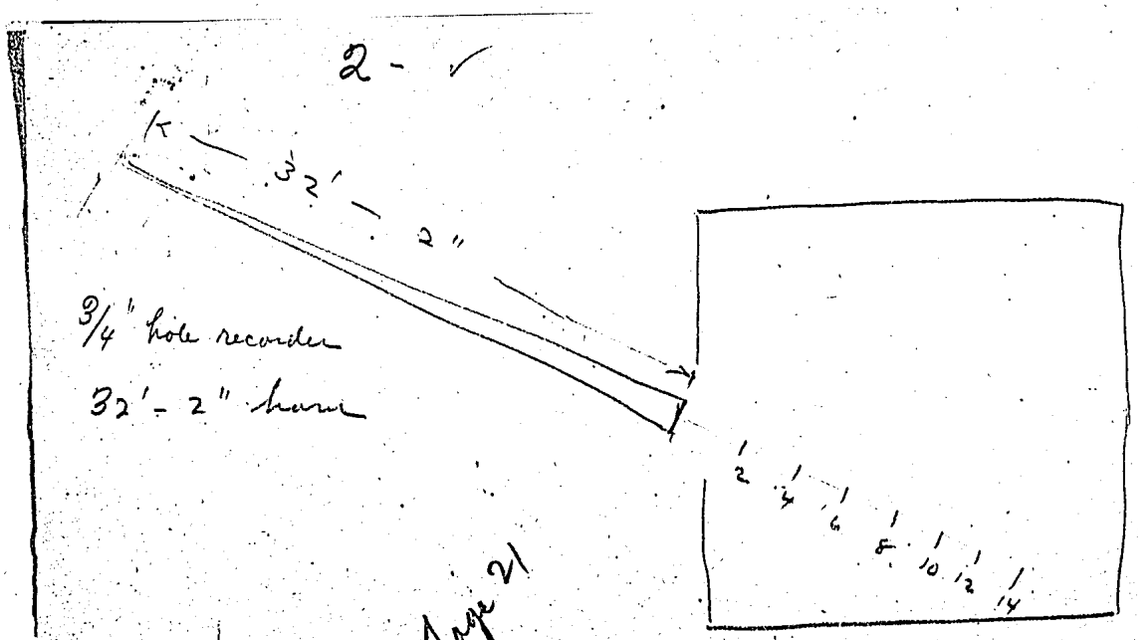
This is much louder than any so far, ~~[illegible]~~
But diaphragm is not held up & controlled by air space enough & quality is like a cylinder phone with a very phonit funnel — sharp timbre at 8 ft. is surprisingly loud

There is too much opening — hence to keep this opening to get loudness you must have either a smaller chamber so air will control diaphr better or increase diameter of diaphr to get more air crushing

OVER

This is a good line of experiments as loudness is satisfactory, only wants quietly -

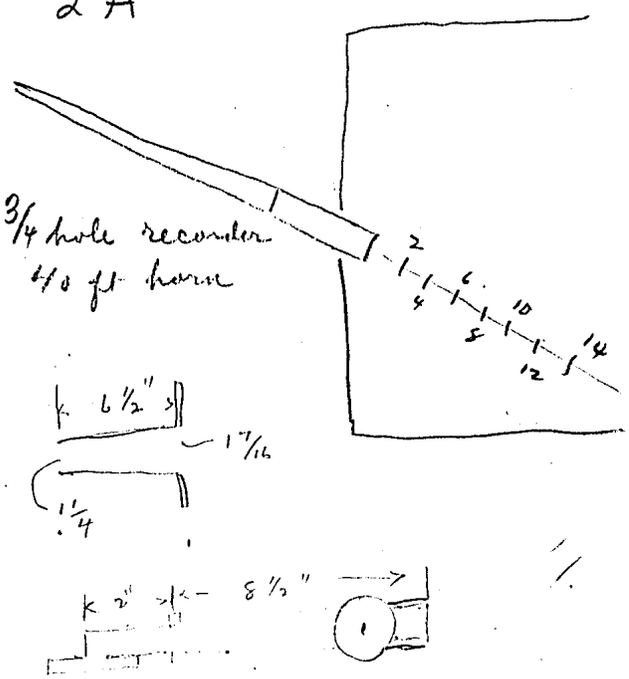
2 - ✓



page 21

Same as #2 page 21, except Horn is longer

2 A



2A

About same loudness as # 2

Quality a little better

think this is 80% of loudness of No 2

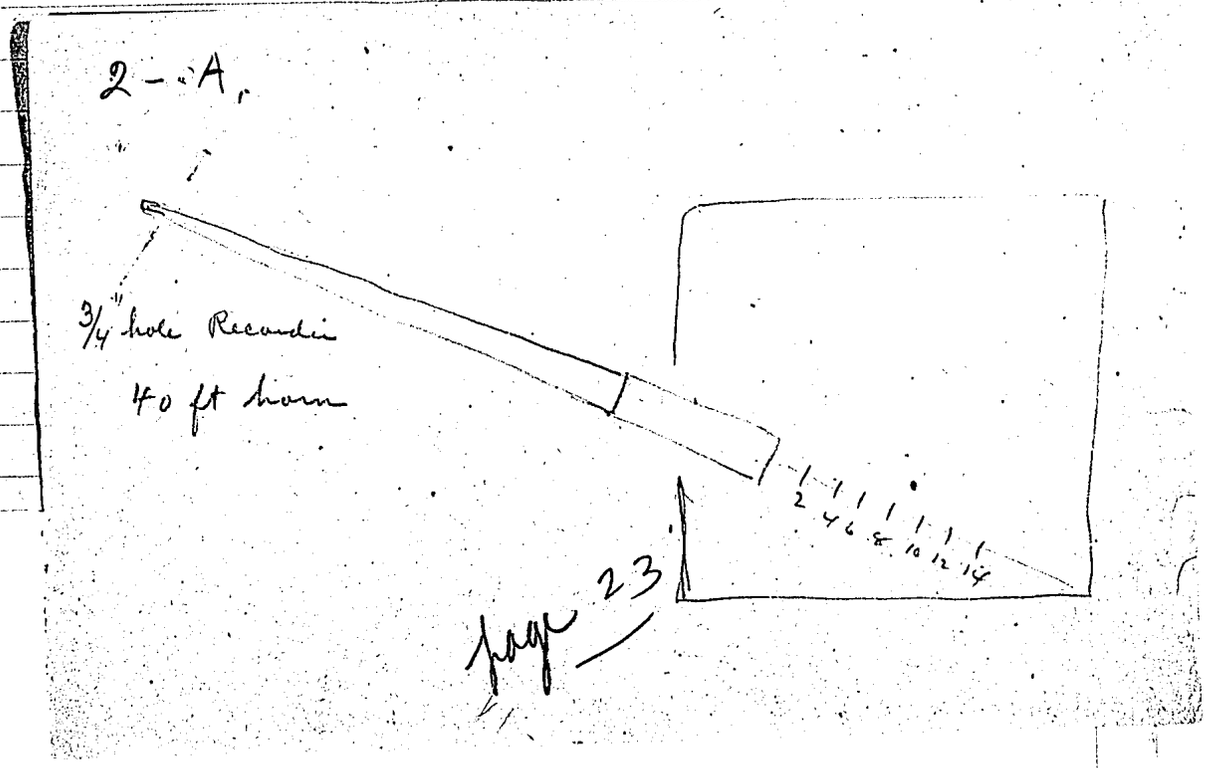
This would indicate that lengthening the horn did not increase the loudness

No 2 A -

about same ~~[illegible]~~ loud as No 2

quality a little better

think there is 80% of loudness of No 2

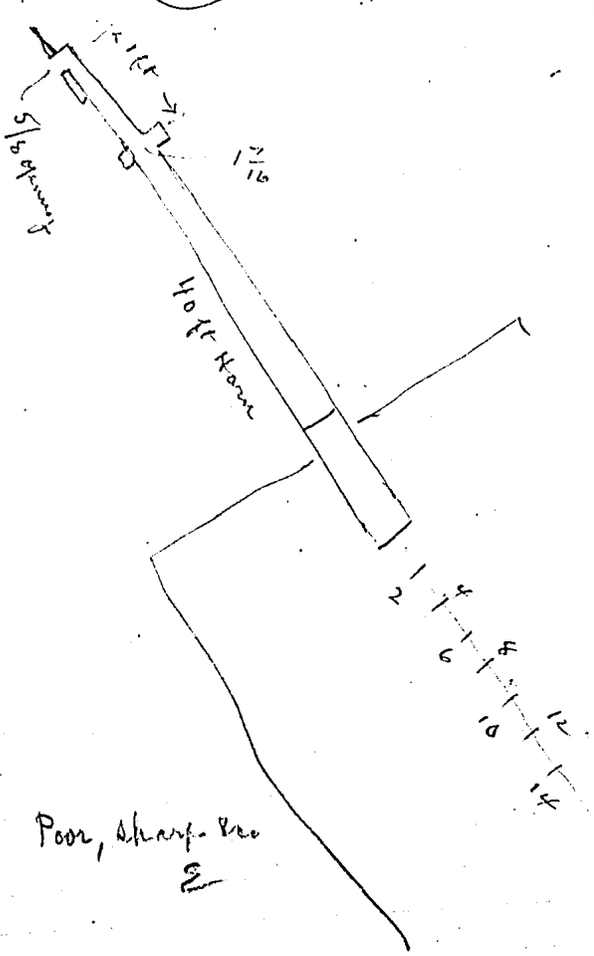


page 23

25

Exper. long horn, 5/8 opening & clubber angle at small end

(3B) Reg. Recorder



Poor, sharp. Rec

26

3B.

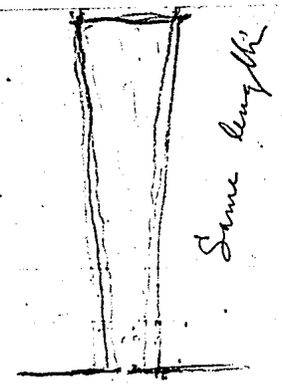
Very Poor quality Shark, bad loud at 4 & hear good at 12

3_B Very poor quality
discard at 6 &
page 24 dead at 4 & hear good
at 12

page 20

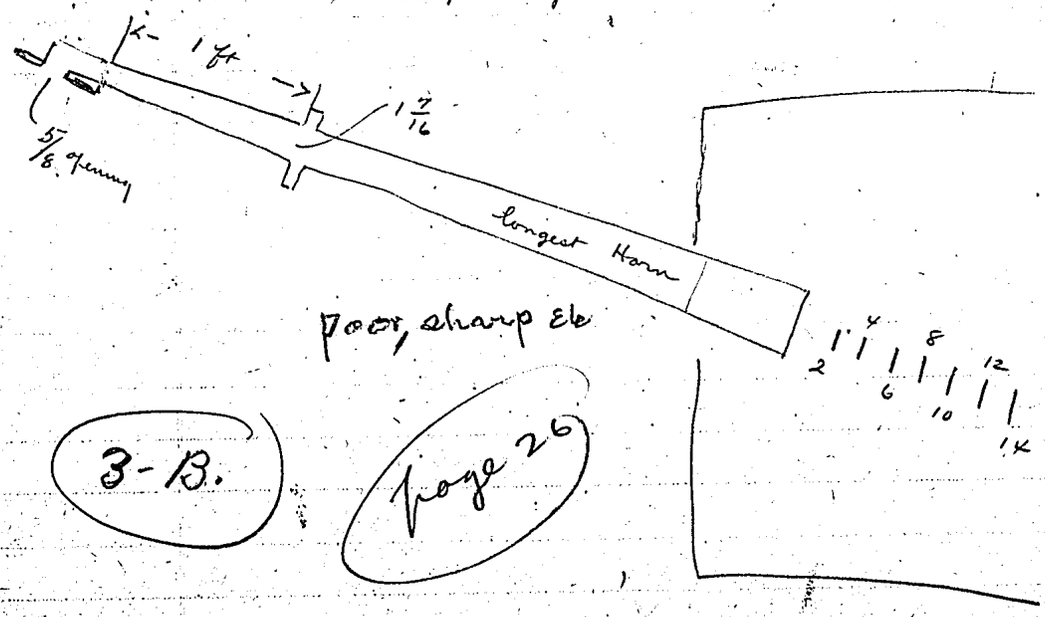
4-B Quality mellow
+ very much better
3 B | wants a little more
control by the chamber
an in chamber wants to cushion
& control more - must
change should be to 3/8
opening of chamber lessened
a little —

Ok same comments



3 ✓
5/8 ✓
1/2 ✓
3/8
1/4

Experiments long horn with 5/8 opening
+ steeper angle at small end



poor, sharp Elb

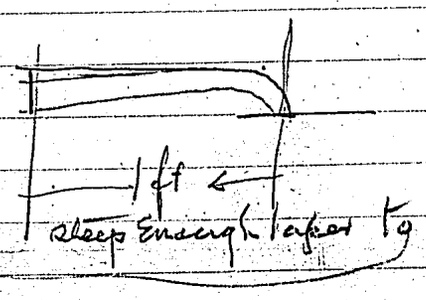
3-B.

page 26

DEC 3 1919

Walter

With your 3/4" opening there is too little cushioning of air not enough to make diaphm hold — I think you should make the taper sleeper for last foot so you



have 5/8 hole

Another one with 1/2" hole —
Reg being 3/8

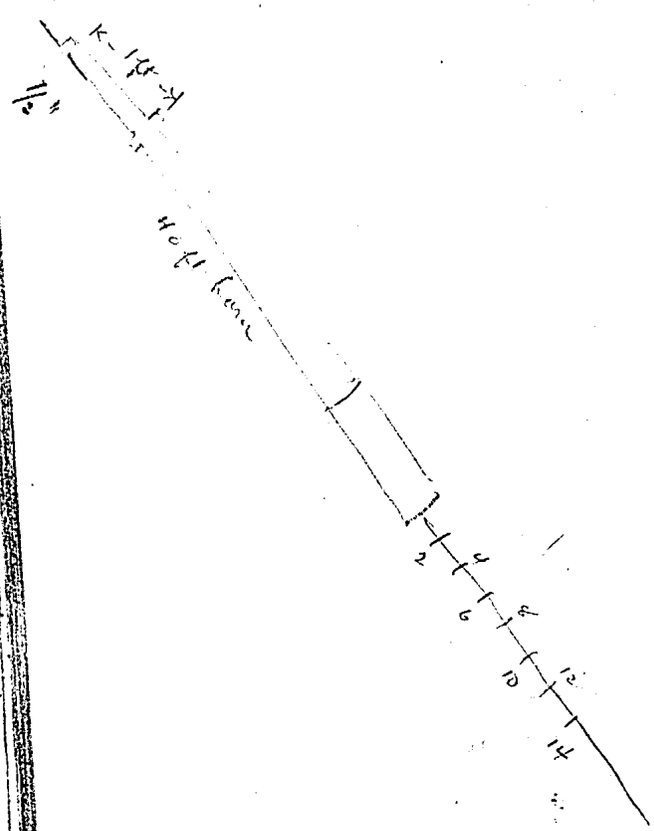
As the waves are almost straight when they reach last foot you can make this foot a sleeper taper without much loss & hence get a better cushioning

Elem

27 Exper, long horn, 1/2" opening + steeper angle at small end

Key December

4 B.



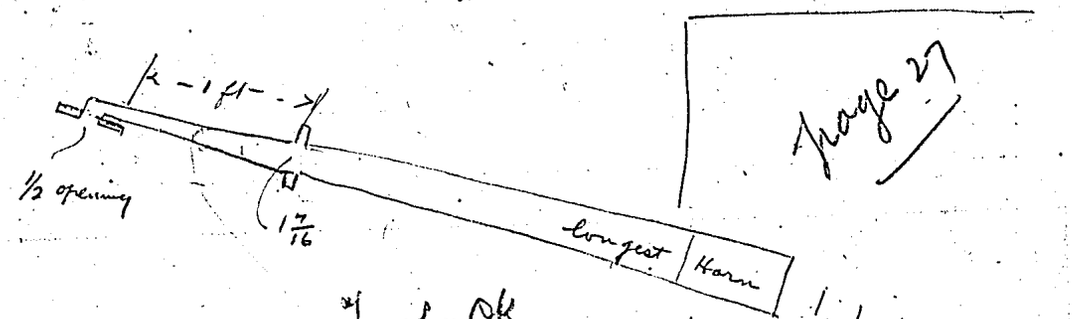
(4B)

Fairly OK but, another with taper so comes to 3/8 opening make another & run down to 3/8

Quality mellow + very much better, wants a little more control by the chamber, air chamber want to cushion + control more. Next change should be to 3/8" opening + chamber lessen a little!

Its same loudness as 3 B,

Experiment long horn with 1/2" opening
+ steeper angle at small end.



page 27

*fairly OK
Cut another
with taper as curves
to 3/8 opening
necessary

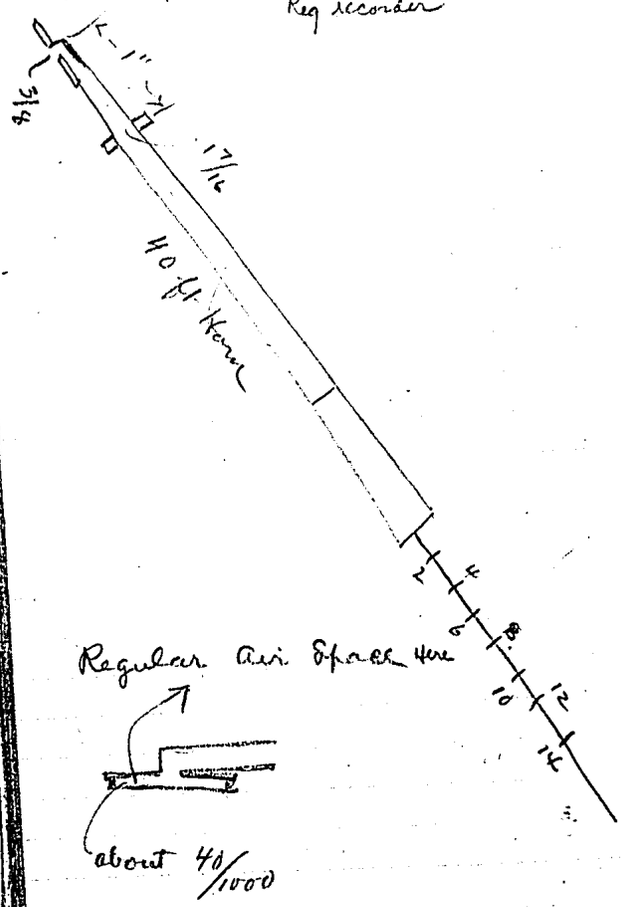
4.-B.

Make another
Taper + turn down to 3/8
opening

29 Exper, long horn, 3/8" opening
+ steeper taper at small end

5B

Diaphram 1 5/16
Reg recorder



30

5B

Shade louder at 6 ft
Not much difference in quality
(compared with Reg Recorder)

Standard Recorder - 40 ft Horn

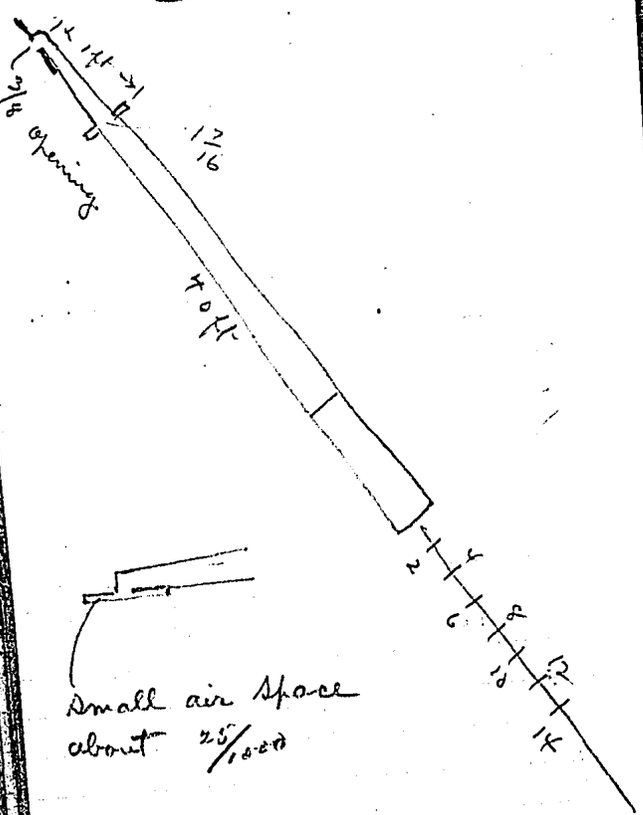
4 ft ok for casual listening not
as good as it should be +
6 ft ok just but unnecessary

Page 29

Shade Lower vol at 6 ft not much
deformation in Quality —

31 Exper, long horn, 3/8 opening
steeper angle, small air space
Diaphram 15/16

6 B



Small air space
about 25/1000

6 B

32

Not as loud - Considerably
less loud at 6 ft -
Quality better all thru

(Compare with Rec. Recorder
page 29

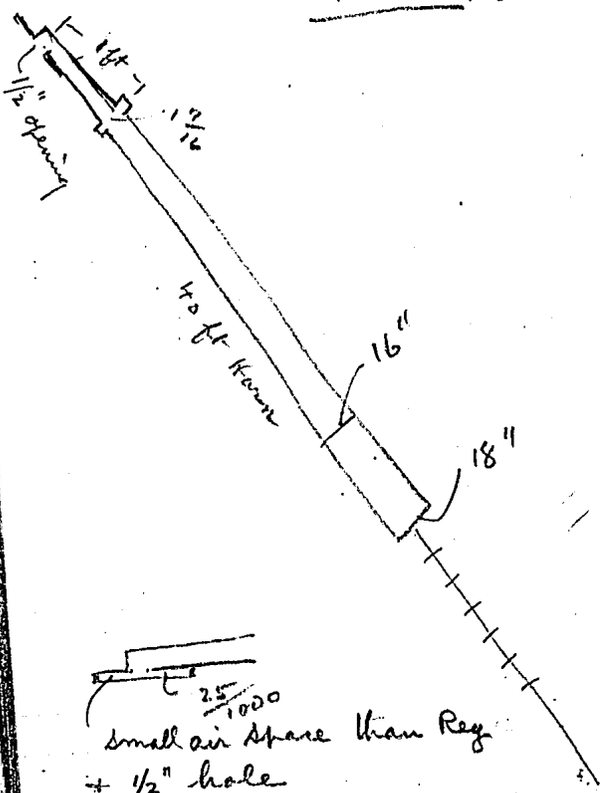
Page 31

Not as loud - considerably less heard at 6 ft — Quickly better all Term

33) Exper, long horn, 1/2 opening steeper angle at small end and small air space

7B

Diaphragm 15/16



Small air space than Reg + 1/2" hole

Seem louder than 3/8 opening
Quality about same

7B.

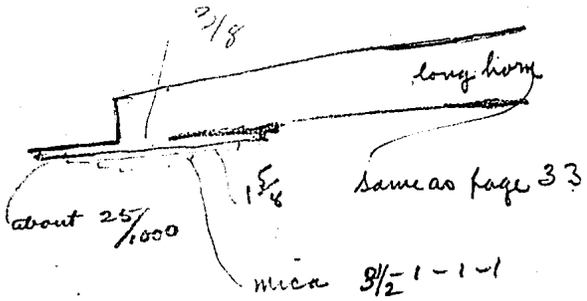
Louder than regular all thru + quality a little better
Should say that at 6 ft it would be ok loudness for most instruments
Weaker ones could come nearer + louder ones further away

Page 33

Louder than Reg all Then I
quickly a little better should say
that at 6 ft it would be OK
loudness for most individuals
weaker ones could come
nearer & louder ones
further away

35/ Exper, long horn 3/8 opening steeper angle at small end and small air space and 1 5/8 diaphram

8B



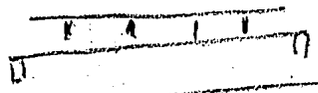
Results
See page 41

8B

Volume 95% of Reg but quality very great improvement, its more muffled & has a peculiar reinforced note which comes at times, but quality is greatly improved should say 100% improvement some thing is in tune with one note.

Different thickness of wire
same length

Book says 4 post thinner wire



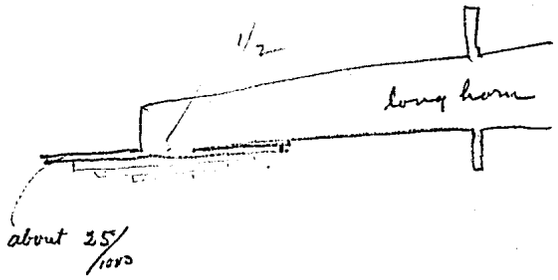
F. 135
Book say short wire
is sharp + less mellow

Real short wire

Page 35

Volumen 85% of Reg but quality very great improvement its more muffled & has a peculiar reinforced note which comes at times but quality is greatly improved should say 100% improvement. Sounding in tune with one note,

9.B. Same as 8 B except - opening which is - 1/2"



9B

105% loudness of Regular
The quality is not up to page 35, but it far better than regular in fact no comparison

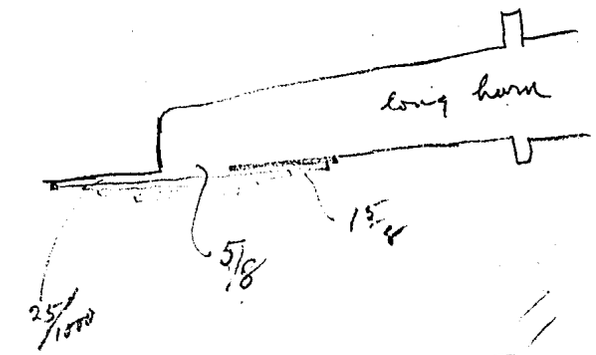
It amplifies one note (base) but not so strong as 35

Page 37

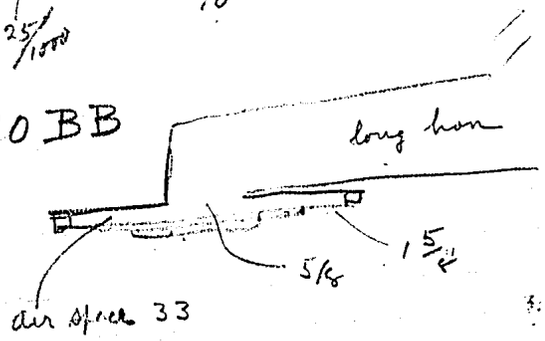
105 Loudness of Rig—
The quality is not up to 35
but is far better than Regular
in fact no comparison
It amplifies 1 note (bass)
but not so strong as 35

✓ 39.

10 B Same as 8B + 9B except opening which is 5/8"



10 BB



This is louder + fuller than Reg

10 BBB

Same as – 10BB but gasket on end - for bigger air space

Results – Sound as 10BB but fuller

10 B

Little louder than Reg

Sharper than 37, quality not so mellow

Reinforces that - same note

Page 39

Little louder than Frey

Sharper than 37.

Quality not so mellow

Ramforeas ~~that~~ same

note,

41

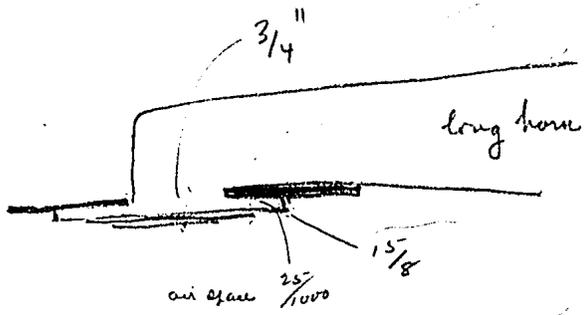
Conclusions with others

15/8 Wheatstone 100% = perfect

	Experiment	Sound	tone	
Opening 3/8"	8B ✓ page 35	73	81 ✗	same morning
1/2"	9B ✓ page 37 ✗	76	79 ✗	
5/8	10B ✓ page 39 ✗	78	81 ✗	
Reg 5/16 + no wire		80	80	
3/4	11B - page 43	76	83 3	re-morning
3/4	12B - page 45 ✗	80	tried again 82	83 OK
not heard 4 5/8	10BB page 39	88	80	83 1
5/8	10BBB page 39	82		85

8 days page 45 best
" 37 } next
" 39 }

11.B - Same as 8 B except opening which is 3/4



11.B

90% loudness of Reg

Quality not as good as page 35

but better than Reg

dont hear the reinforced note

Page 43

90% of loudness of Reg

Quality not as good as

35. but better than Reg

don't hear the rearranged note

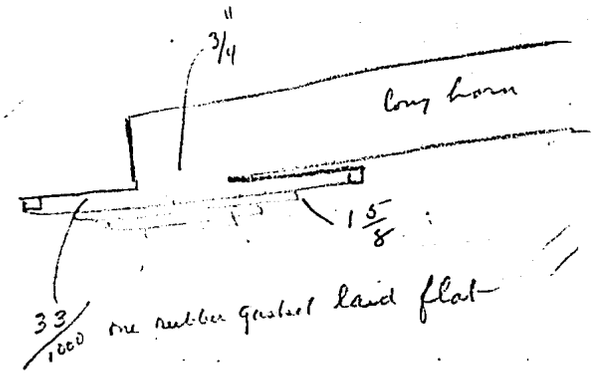
45

Jan. 10, 19

12 B

Found that 11B – 3/4 opening was very good quality

Try larger air space to get it louder



not quite as loud as
as 5/8 opening with same
air space
Quality about same
See page 41
tried this again +
found 3/4" opening a
shade louder than
5/8"

46

12B

Loudest yet 115 to 120 ⁻
quality better than Reg

not so good as page 35⁻, but
if muffle a little would
probably equal it

Has no reinforcement of that
base note

Page 45

Loudness yet 115 to 120 db

Quickly bitter than Reg-

not so good as 35, but

if muffled a little would

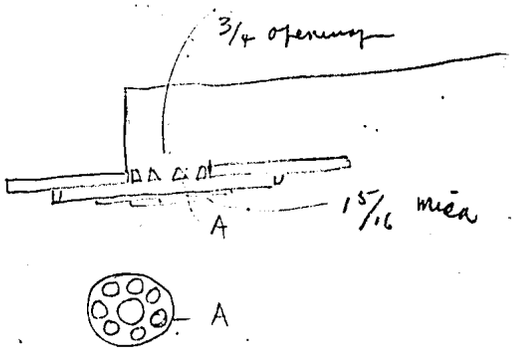
probably equal it

Has no reinforcement of

that bass Note.

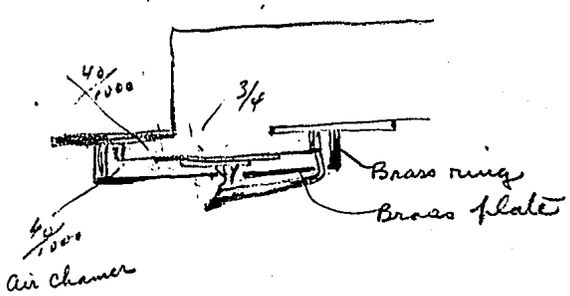
13B

Same as Regular except the perforated plug A



This was very much weaker than regular

N. G

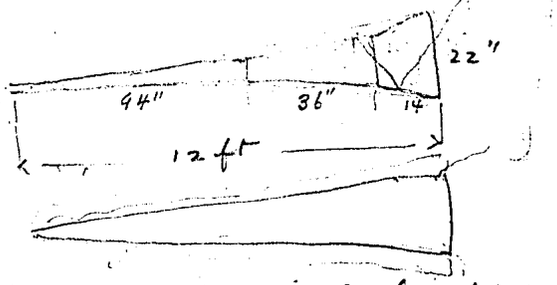


Tried air chamber below diaphram as above

Results- was much weaker + muffled + lacked defenition when compare with out lower air chamber

Horn Comparisons, Reg. Recorder

Compared long 40 ft horn with



Short horn is loudest + fullest

Seem to be a slight difference in quality, long horn sounds more distant

trial comparison at 4 ft + 6 ft aways - short was loudest in both cases

1st trial 12 ft Horn 4 ft away
2nd " 40 ft Horn 4 ft away
3rd " 12 ft " 6 ft "
4th " 40 ft " 6 ft "

Made this again, rotation are reversed in 2nd trial.

1st - 12 ft Horn - 4 ft -

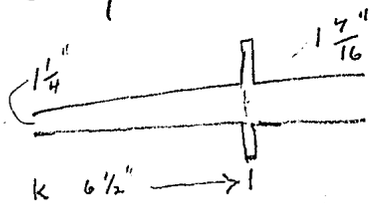
2nd 40 ft Horn - 4 ft -
little louder than 1, best cornet quality

3rd Short - 12 ft - Horn 6 ft -
Louder than 4, best quality cornet of any heard

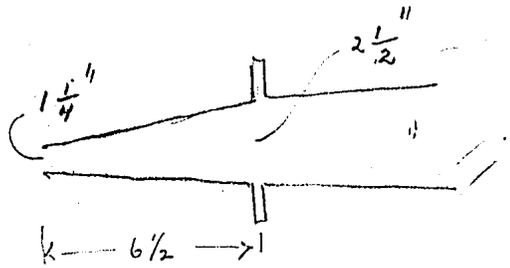
4th 40 ft Horn - 6 ft -
Quality cornet not as good

Long horn. different end

(1)



(2)

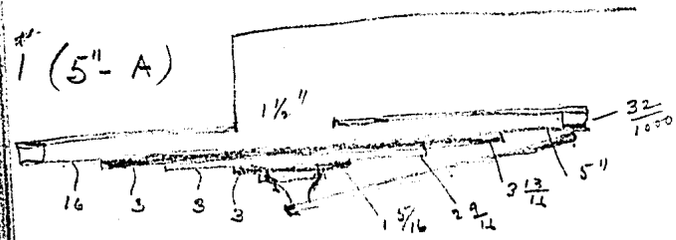


both use with 3/4" opening diaphram

#2 was a little louder than #1. but very poor sharp tone

5" Recorder

#1 (5"- A)



Tried diaphrams 7 - 2½ - 2½ - 2½
+ 12 - 3 - 3 - 3 + 16 - 3 - 3 - 3
the last one was best + was used
in following experiment
5"- A was very weak
thinner diaphram was weaker

#2 (5" B) as above but 5/1000 air
space instead of 32/1000
Very much weaker than #1

#3 (5" C) same as #1 but 57/1000 air
space - louder than #1 but ~~two~~ weak

#4 (5"- D) same as #3 but short
arm
Two louder

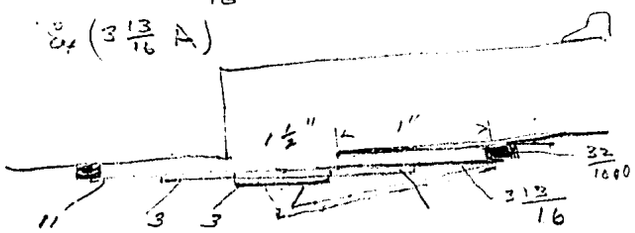
2
Hardly hear these

Page 54 —

Hardly hear them

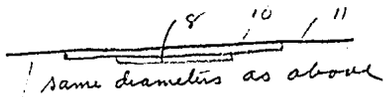
$3\frac{13}{16}$ - Recorder

Ex ($3\frac{13}{16}$ A)



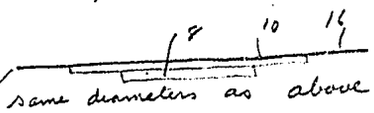
Louder than 5" - but too Weak

Ex ($3\frac{13}{16}$ B)



same diameters as above

Ex ($3\frac{13}{16}$ C)

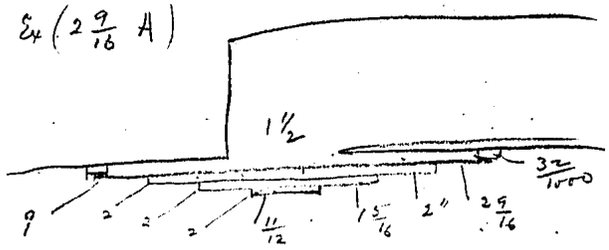


same diameters as above

did not try these two as the variation of diaphrams on page 58 showed so little change

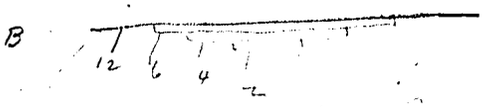
$2\frac{9}{16}$ Recorder

Ex ($2\frac{9}{16}$ A)



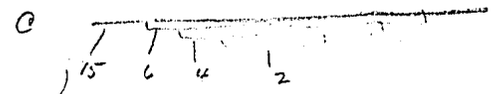
louder than either Page 54 or 56
+ better definition

B

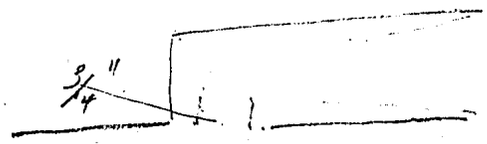


Results weaker than 9/1000 dia

C



Results not as loud as 12/100 dia

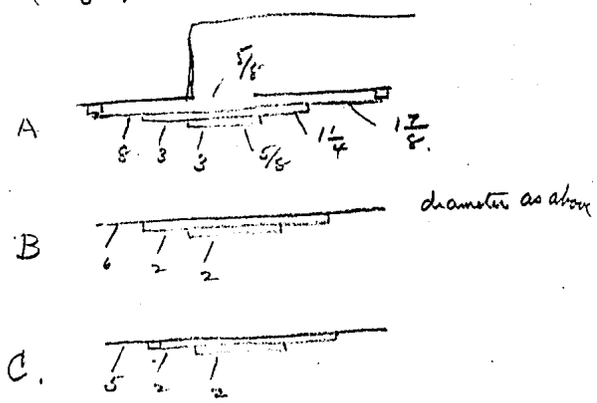


tried 3/4" opening by means of bushing
as per sketch with dia C.

Results was considerable
louder, but only half of
the Reg standard
So far g. As the [illegible]
gets smaller from 8" [illegible]
results have been [illegible]
will try 1 7/8"

$1\frac{7}{8}$ - diaphragm

Ex ($1\frac{7}{8}$ A) $5/8$ - opening



Results A was very weak
B shade louder
C - was loud + fuller than A or B

C. was fuller than regular, +
or shade weaker

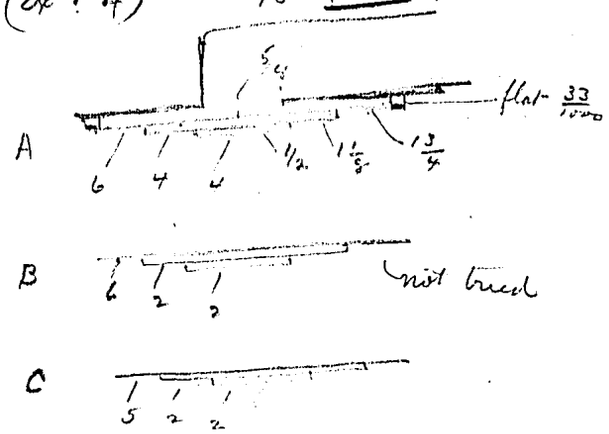
Compared with 10 B B page 37
C is weaker + fuller
This shows that with 5/8
opening - $1\frac{5}{8}$ this is better
than - $1\frac{7}{8}$

Loudness commercial telephone
judge between 4 + 6 ft.
say 5 ft.

Correct nearly natural but
still same wave

1 3/4 diaphram

(Ex 1 3/4) 5/8 opening



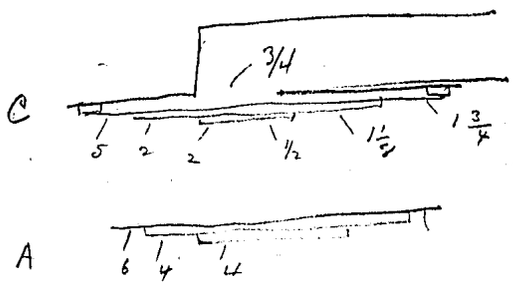
C is louder & clearer than A
C is louder than - page 60 - C

C compared with 10 BB. page 39
shade weaker than page 39
but very little
? as to which is best I
prefer 1 5/8

only Commercial tried at 4 ft -
6 much too weak
Variations of Volumn on Sustained
notes of Cornet much less &
quality of Cornet very much
more natural.

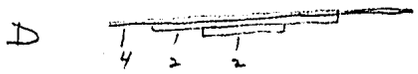
63

3/4 opening
1 3/4 diaphram



A - much weaker than C.

C is weaker + fuller than page 45 12B
which is 1 5/8 diaphram + 3/4 opening



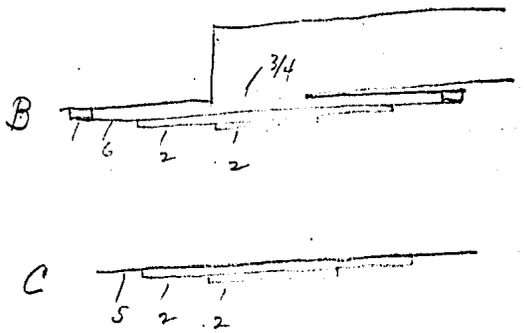
D is louder ether A, B or C
shade weaker but fuller than 1 5/8' diaphram
3/4 opening Page 45

64

Not as loud as page 7,
Volumn at 6 ft too weak for
Commercial Work
Irregularity on sustained sound
notes very great, on flute so
much so that cornet sounded
entirely unnatural

65

3/4 opening
1 7/8 diaphram



B is much weaker than C
C is ~~[illegible]~~ fuller than 1 3/4 diaphram
about same loudness as 1 3/4 C page 63

66

Commercial ok at 6 ft.
but cornet some what
unnatural + wavy.

Feb 7th 1920

Conclusions to date

1 5/8 diaphram best diameter

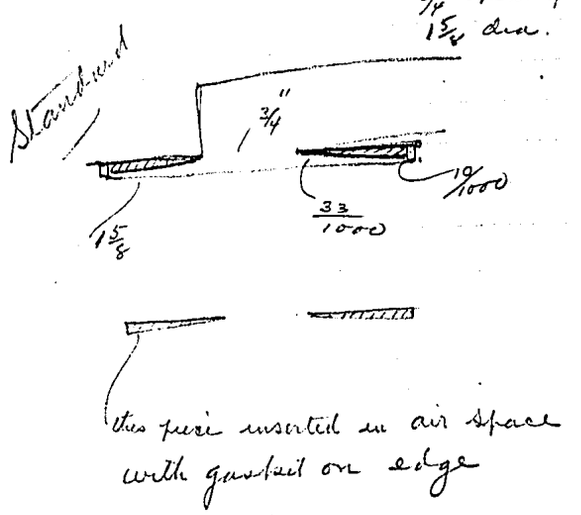
25/1000 air space - N.g

flat gasket (33/1000) air space is always better than 25/1000 " space

between 5/8 + 3/4" openings

After several trials 3/4 is loudest

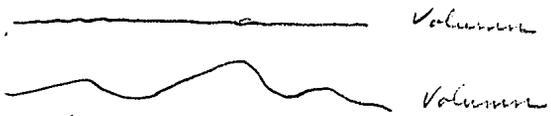
Air Space Experiment



this piece inserted in air space with gasket on edge

Result this is louder + fuller than page 45 – 12 B. which is without above plate

20% louder (than page 45) 6 ft away loud enough for commercial
Lively Power
Page 45 sustained note or cornet steady



on 69

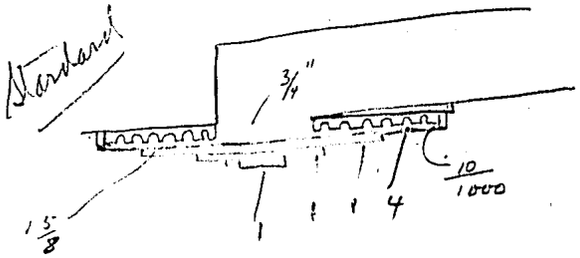
This phenomena occurs in lots of our records + I cannot understand how it is possible to vary the volume on a constant-volume sustained note

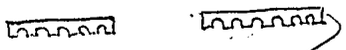
If recording machine varies in each revolution, but always want 80 per min when times this would do it

Means that if this volume variation was regular at 80 rev it might be the machine, runouts or eccentricos

Air Space 3/4 opening
1 5/4 dia

Standard





thus inserted in air space
with gasket on edge

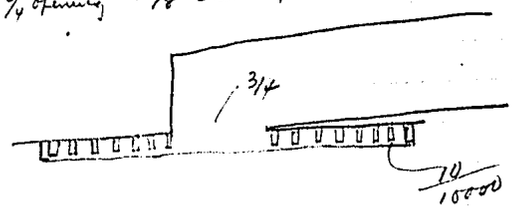
Results about same as
page 69 might be a little
fuller

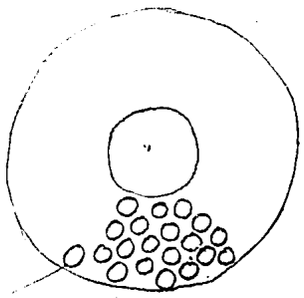
Loudness same as 69
loudness at 6 ft loud enough
for commercial work
Quality a shade better
I think cornet surbalanced with
still wavy

73

Air Space

3/4 opening 15/8 built up mica





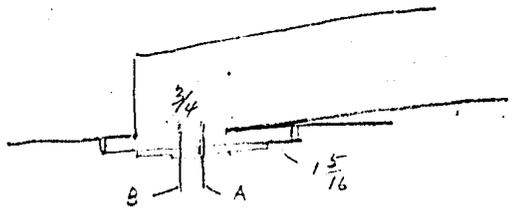
disc inserted in air space full of 1/8" holes to act as dash pots

Results weaker than page 69 or 71

74

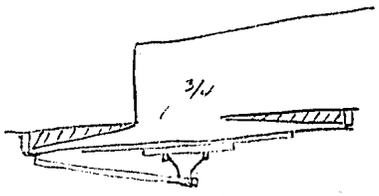
not quite as loaded on left as 71, not loaded enough for Commercial, quality not as good as 71, but small difference

Off Center



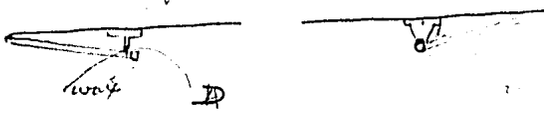
try mounting diaphram 1/8 off Center with foot of arm at A also with foot of arm at B when compared with regular ~~as~~ mounting, ~~[illegible]~~ neither A or B showed any improvement,

Arm Experiment



A Above same combination as page 69 except arm with is tube type

B as above but arm cut and used as follows



C. filed to a delicate point @ D.

A

B. is louder than A

but both cornets are wavy

Conclusion to here

Page 45 – 1 5/8 dia 3/4 opening
louder than Reg

Page 69 same as above but
air space
this is 20% louder than 45

Page 71 same as 45 but air
space same
loudness as 69. Quality better

Page 77
Say new arm is louder

Page 50
Say 12 ft horn is louder
+ better Quality

Compared Regular Recorder
with improvement
to date which is

Reg Recorder
+
Page 69

1st trial – Reg Recorder

2nd trial – 1 5/8 dia page 69

2nd is loudest by 20%

Horns

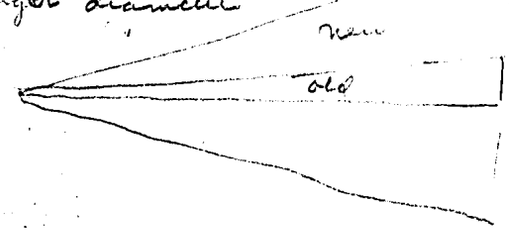
Same comparison as Page 50
but in following Rotation

1st trial	40 ft Horn	2 ft away
2nd "	12 ft "	2 ft "
3rd	40 ft horn	6 ft away
4th	12 ft horn	6 ft "

1st Slightly louder

4th Slightly louder

Mr Edison:
Very little dif[illegible] between
these horns, suggests that
40 ft horn, could have a
sharper angle & make modifi
larger diameter



83 E?

N. Y. Comparison
of (Big dia page 69, 1 3/8) + Reg
With Raffold Horn
+ Geo Ballard

1st track
Reg dia (wire) 6" away

2nd Big dia. 6" away
Track muffled not as loud
as #1

3. Big Dia 10" away
Sounds weaker than #2

? to show E

84

Comparison of Reg &
Reg Dia (pg 69) with 40 ft horn
with Geo Ballard

1st Trial - (wire Reg Dia) 10" away

2nd Reg Dia (wire) - 10" away

2nd Best - Clearest - #1
has horn sounds through at
loudness about Dance

(duplicate
see page 87, + 89)

87 v Geo Ballard in Person

Reg Dia (wire) + 40 ft Horn

1 - 6" away

2 - 10" away

3 - 14" "

4 - 18 away

Better than #4 page 89
thinner quality loudness
of anything a shade weaker

(E) note
see 1 + 2 p. 89

E. days

1st loud - 70° can hear but little music
muffled not clear lot of reproduction

2nd loud 67 - Clearer + more intelligible
hear some words still muffled some

3 loud 65° Clearer not so muffled hear
3/4 of the words more pleasing

4 loud 63 Clear - OK not muffled
natural

Page 87

③

Rey Hen

1st 70% Cant hear but little music –
6" Muffled & not clear. lots of reflections –

2nd 67% Clearer & more enjoyable
hear some clearly – little
10" muffled sound

3rd 65 – Clearer not so muffled
hear 3/4 of the words
14" more pleasing

4th 63 – Clear – ok not muffled –
natural
18"

89 Ev Geo Ballard in person

Beg Hea (Page 69)
+ 40 ft Horn

1st — 6" away

2 — 10 — away

3 — 14 away

4 18 away

(E) for comparison of Vocal on 15/18 + 15/16 recorder

E. says

1st loud - 70 not so muffled quality
Hear 1/2 the words quality fair

2nd loud 72 - little better than # 1 in quality loud + less muffling

3 loud 67° not as good as # 2

4 " 66° " as good as # 2

Page 89 — New Idea

1st — 70% — not so muffled greatly — quality fair
6" hear ½ the words —

2nd 72% little better than No 1 in quality, clear — & less muffling —
10"

3rd 67% — not so good as 2
14"

4th 66 — not as good as 2
16"

E ✓

Ballard Record + Phone

	6" away	Loud	tone
A	40 ft horn	70	70
		Sounds distant	
B.	12 ft horn	70.	70
		Same as A	
C.	4 ft 8' Rapfold Horn	75-	60
		not so distant + louder + sharper	

(E) to show vocal is better on short horns.

E says

A	loud	70	only fair
B	"	68	quality good
C	"	75	quality not so good as B.

Page 91

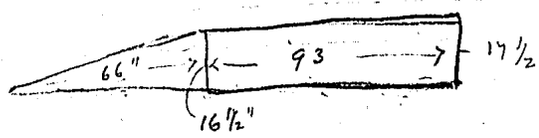
A. 70% only fair

B. 68 — quality good

C 75 — quality not so good as B

93 E/ Ballard record

Horn # 3



Compare above Horn with 40 ft horn with Ballard record - 4 ft away

trial

1. Recorder # 60 + Horn # 3

2 1 5/8 + 3/4 recorder page 69 + Horn # 3.

X

3 Recorder # 60 - 40 ft Horn

4 1 5/8 + 3/4 recorder page 69 + 40 ft horn

(E) for above

Phon. meter 2 loudest 40
4 next - 38 - 40
3 next - 35
1 weakest - 30

Compared 1 + 3 for horns, 1 was loudest + not so muffled as trial 3

Compared 1 + 2 for recorders. # 1 was shade louder + clearer

Compared for horns # 2 + 4 - two is louder + not so distant -

E. says
1st loud 70 quality not very good music faint. OK for Com'l Volumn

2 - Loud 85 quality much better hear words OK + some of music, louder than Com'l necessary

3 loud 68° quality fair not so good as # 2

4 loud 68 not so good as # 3
Wounld says it bad
2 is best + loudest

②

Page 93

1st 70% – quality not very good ~~Ok~~ for Comml Value
Music fair

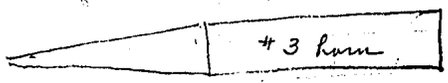
2nd 85% quality much better hear words
OK & some of Music – Louder
than Comml necessary.

3rd 68 – quality fair, not quite so good
as 2

4th 68 – not so good as 3 –
would say its bad –

2 is best & loudest

95 W/ Band Records
same tests as page 93



Horn + recorder Comparisons

Grab
1- Reg. Recorder #60. Horn #3

2 - 15/8 + 3/4 page 69 Recorder Horn #3
X

3, Rego-Recorder #60 - 40 ft Horn

4 - 15/8 + 3/4 recorder + 40-ft horn

Phonometer 2 loudest-
3 next
1+4 same + weakest

Compared 1 + 3 for horns with Band loudness about the same, 3 has no high sounds, its all bottom, if any difference in loudness #1 is.

Compare 1 + 2 for recorders
loudness about same, #2 is bottom heavy.

Compared 2 + 4 for horns. 2 is louder + not so distant-
shows that these results are for volume ~~are~~ different from Vocal see page 93

E. Days

1- loud 70 Cornl loud enough pretty fair quality
2 loud 85 but Melody waves (Cornet) quality poor, loudness brings out defects
3 loud 68 - Waves a little not so conspicuous, quality perhaps a shade more pleasing than #1
4- loud 70°. Waves a little but more than 3 quality fair about same as #1, There is a resonance some where in this or Cornet

Page 95:

1st 70% — Cornet loud enough — pretty fair quality
New Horn
Roy

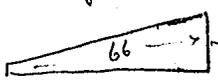
2nd 85% but melody wavers (cornet) quality poor
Loudness & range not affected —
New Horn
Roy

3rd 68% — wavers a little not so conspicuous
quality perhaps shade more
pleasing than No 1 —
Hoff Horn

4th 70% wavers a little bit more than
3 — quality fair almost
same as 1 — There is
a resonance some where in
lips on Cornet,
Hoff

See page 99

High + Low Whistle



Big dia

= Short Horn

Whistle 1 ft away -

1st High Whistle Short Horn

2nd High Whistle 40 ft. Horn

3rd Low Whistle Short Horn

4th Low Whistle Long Horn

See page #99

With high whistle short horn is much louder

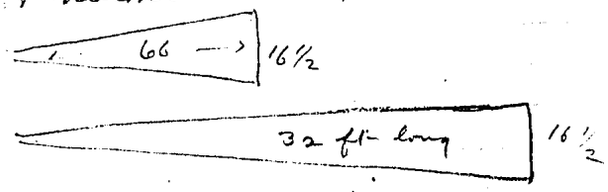
With low whistle loudness about the same, in long horn the tone is softer & little muffled.

Will not show this as page 99 is same thing + horns opening are same diameter

E/ 99 E/ Comparison of

High + Low Whistle

with Reg 15/16 recorder + horns below, whistles 12" away



1.st High whistle 32 ft horn
- 0 - Phono Meter

2nd High whistle 66" horn
louder than #1 Phono meter - 0

3rd low whistle 32 ft horn
louder than 4 - Phono Meter 55

4th low whistle 66" horn
Phono meter 90

Results
in short horn high whistle is louder, in long horn low whistle is louder

E

E. says

Can not hear the high whistle, try + get a louder whistle

Phono meter will not register high whistle

By ear the low whistle is loudest with trial # 3 long horn

With Phono meter it is reversed short horn is loudest,

Page 99

	Loudness	Tone
1st	70	70
2nd		
3rd		
4th		

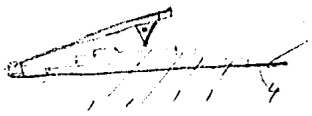
low

High

101 E

Pointed Arm Recorder $1\frac{5}{8}$

Band Record - 4 ft away



$1\frac{5}{8}$ - $\frac{3}{4}$ Heavy

1st trial

Best $1\frac{5}{8}$ Recorder to date page 71

2nd trial, everything the same except arm which has pointed foot + no roots

This is louder + fuller than #1

(3) try above

$1\frac{5}{8}$ to be .001 instead of .004

This is much louder than 2nd trial above 4-1-1-1 + most sensitive to date, Cut is rougher but thinks it passable

See page 117

102

E say

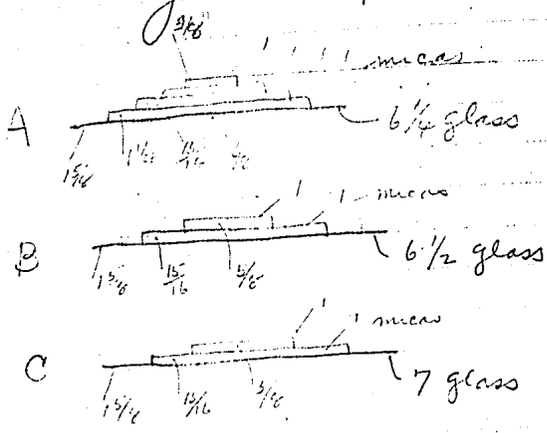
1 loud - 70 quality not good

2nd " 85 little better Quality

Page 101

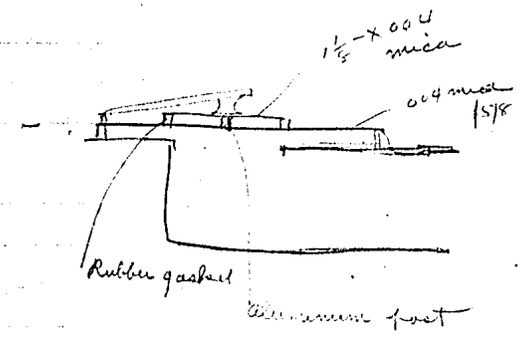
	brilliance	tone		
1st			7/8	quality not good
	"			
2nd			85	- little Geller quality

Glass Diaphram 1 5/8



	Loud	tone
A	68	70
B	68	68
C	65	65
Standard	70	70

Glass are too thick will try & get 4 or 5 thousands thickness



Much weaker than standard
bass seem much weaker although it is not than tone

105 a/

Comparison of Piano

On 15/8 Rec. + Reg. Rec #64
~~with #3 horn page 93~~

1st Reg #64 Rec. longest Piano horns
2" away - Reg way taking Piano

Best ? See #3

2nd Standard 15/8 Rec page 71
with #3 horn page 93 - 4 ft away

fuller than #1 - more uneven
middle of Piano - notes more explosive than #1

3. 15/8 Rec - 3/4 opening - mica 1-1-1-1-1
fronted arm - #3 horn 4 ft away
see page 101 - (3)

This is louder + fuller than any of above + as even as #2

Question between this + #3
will try further

106

Object of comparison to compare results of New apparatus to date, with Regular methods of recording

Results so far seem to show that nothing is gained by ~~distant~~ working a distant from horn, when you get horn + recorder sensitive enough they seem to respond to sympathetic notes which make uneven record

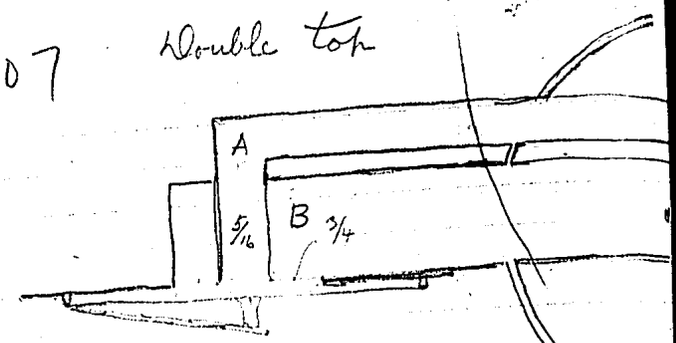
Es says

1	loud	70	fine quality
2	"	68	quality not so good
3	"	70	quality not as good as 1

Page 105

	bundles	tons		
1st			70/-	fine quality
2nd			68/-	quality not so good
3rd			78/-	quality not so good 1801

107 Double top

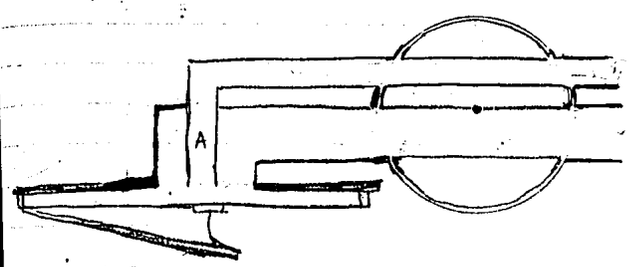


Method of using Two horn without a Y to see if it is louder

Extrance A is very much weaker than B
tried bringing A close to diaphram to get it louder results was weaker
Tried different distances as far as 1/8" — 1/16 is as good as any

Played Phono 4 ft away with 2 horns connected with above top + compared with Regular recorder under same conditions with Y + same style horns - The Y outfit was much louder

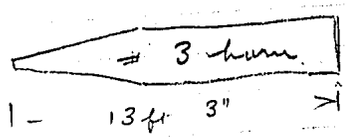
108



See Page 131

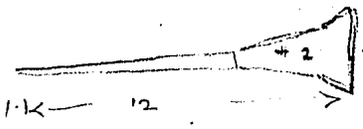
109 (a)

Horn Comparisons



#3 horn
1 — 13 ft 3"

page # 93



#2
1·K — 12

horn page 50

Loudness about the same
#2 horn is considerable fuller

Seems to show that if you wanted to get a thinner tone you can do so by using steep angles at the small end

No sample

110

111 G/

Harp trials

Comparison of N.Y. + Col. Studios

1st - N.Y. with 16 R.H. horn
6" away, horn following the player

2nd Col. Studio # 3 horn page 93
Rec - page 71
Harp 20" away

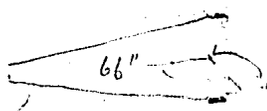
N.Y. is louder + less muffled
Did not show - E

113 E

Harp trials + Horn Comparison
Recorder page 71

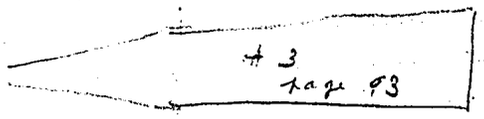
Harp 20" away

1st



1st section of # 3 horn page 93

2nd



#1 best shade louder & less muffled

114

E. says

1 - Best loudest

2nd not so sweet, sharper

?

Page 113.

8 (8)

	Loudness	Tone 70%	
1st	70	70	Best - Loudest
2nd		65 -	not so sweet 2nd not so loud - Sharper

115

Harp trial - #3 horn page 93
(Recorder page 105 #3 - 15/8 - pointed arm
1-1-1-1)

1st trial 4 ft - as loud as N.Y. & much fuller, blasts bad in middle of harp G.A.B
2nd " 6 ft - } weaker than N.Y
3 " 8 ft }

Cords rattle single wire OK,

duplicate
see page 119 + 120

116

117

from page 101

Harp Recording

Same Recorder as (3) page 101
found this recorder rubbed
on harp - tried diaphram 2-1-1-1
~~+ 3 + 1~~ 1, 2-1-1-1 works
best and louder than page 71
but it still rattle a little
tried 3-1-1-1 this is only shade
if any louder than Page 71

118

119 E/

Harp Comparison
with Sen Recorder page 117 - 2-1-1-1

#3 horn

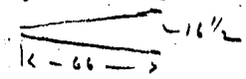
1st trial	20"	away	
2nd "	36	"	
3rd "	48	"	
4th "	60	"	

E says

1	100%	too loud
2	80%	Cont
3	92%	Poor Swell not sweet
4	88	- not good

E 120

Same as opposite page
except Horn

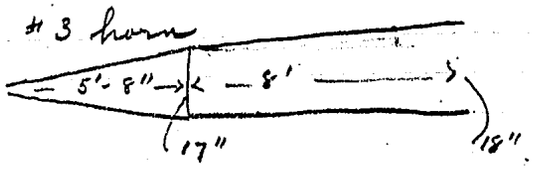
Horn 

1st trial	20"	away	
2nd "	36		
3rd "	48		
4th "	60		

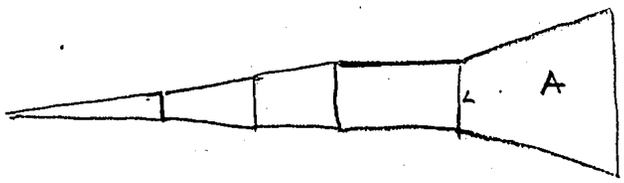
These are more brilliant and less muffle than page 119 and just as loud

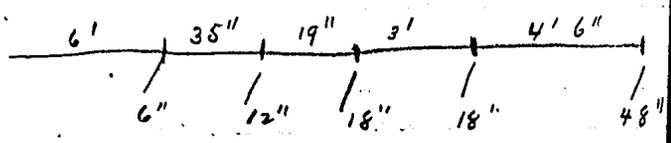
not heard by E

3 horn



4 horn





Compared above with Stand Rec
Page 71

at 2 ft with Phonograph
4 horn was weaker & muffled

at 8 ft, both were about same
loudness but # 4 was very
thick tone

E says

3 horn

1 Too loud
2 Com'l ok loud
3 Little below Com'l loud
4 Weaker but not much

4 horn

1 not so loud as 3, much better quality
2 loud Com'l quality ok,
3 Commercial
4 shade lower than Com'l
All much better quality & don't
lose volume so much as you
go away from funnel as # 3

7/10/20

Page 121

#3 horn

1 too loud -

2 Commercially OK loud

3 Little below Council loud

4 Weaker but not much

#4 Horn

1 — not so loud as 3 but much better quality

2 Loud Commercial Quad OK

3 Commercial

4 Shade lower than Council

all much better quality

+ dont lose volume as much as you go away from funnel as #03 does

Horns

Comparison with # 3 horn and # 4 horn with out bell A. Page 121

Phoned use 4 ft away with Standard Rec. Page 71

4 was considerable better loudest + fullest-

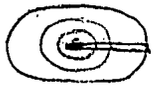
E says

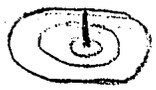
1 com c'l loud
2 ditto about Regh

} Poor Quality Sharp Nasal

Recorders

1 - Standard Rec Page 71

#2  1 5/8 x 1 5/16
4-1-1-1 - mica

#3 as above but arm turned other way 

Standard is best #3 loudest but poor nasal quality-

E says

1
2
3

} Not much difference in Vol
3 strongest - all sharp

7/10/21

Page ~~123~~ 123

#1 Comed Lacu

#2 ditto - about right } poor
quality
sharp
Nicol

Page 124

1

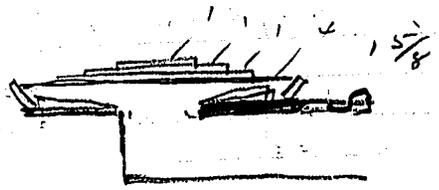
2

3

Not very much dif in Vol

3rd Rhinoceros

all sharp -



#1 Standard Rec Page 71
3 horn

#2 as above drawing
3 horn

Try aluminum ring stuck to outside of disc, results was weaker + thin tone not shown to E.

Results # 2 is weaker + too full

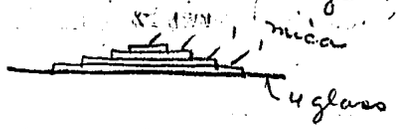
E - says

1 - Cone } very little difference

2 Cone } short

Diaphrams,

#1 Standard Rec Page 71

#2 

Results # 2 louder, fuller + better than Standard

Broland tried another, results New glass 4-1-1-1-1 much than Standard

7/10/20

Page 125

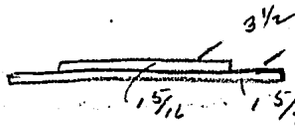
#1 Concl } very little diff

#2 Concl } Champ

127

Diaphrams

1 - Standard Recorder Page 71

2 - 

all glass

Loudness about same
#1 quality best

E days

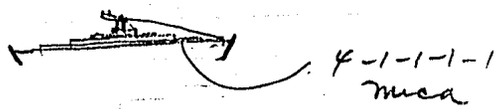
128

Dome

Compared above with Stand Page 71
above was weaker, fuller + less definition.

E - days

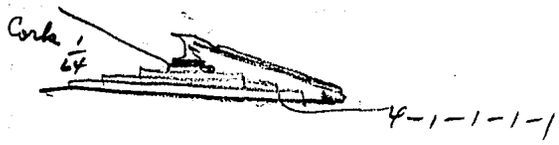
Gasket Ex



Compared with Standard Page 71 it was just as loud + not so solid Tones

E says

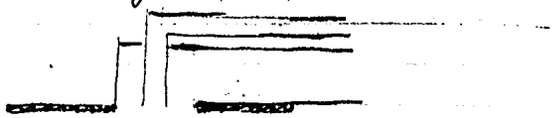
Cork



tried above with + without cork
Cork seems smooth
loudness the same, tone may have been biger with cork ?

E. says

Double Recorder. July 12, 20
from Page 107



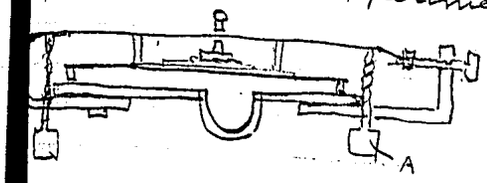
1 made a test with Phone with Standard recorder & horns + Reg Y

2 made same test with double recorder using the same diaphram needle + gasket.

#2 was shade weaker tone about the same.

Conclusion that there is nothing gained by this recorder probably could be made to work as good as Reg Y, but if so, could not use the dummy, also instrument playing to the center entrance would have to be closer + the entrance is the weakest

Wire experiment.



1. made test - Reg adjustment with 2 posts

2 - as above, but screw A lower 1/2 turn to put pressure on dia phram, also loosens wire

3. same as 2 but wire tightened, about same tension as #1

Results	loud	tone
1	70	70
2	71	72
3	69 -	71

Shows that when posts are used pressure on diaphram make record fuller and weaker

Try same experement above, but with out posts wire fast to arm

1. Reg tension wire fast to arm
2 A unscrewed 1/2 turn. + as above
3 - same as #2 plus wire tightened

Results	loud	tone
1	70.	70
2	72.	72
3	69 -	72

Results seem to be same as with posts

133

Diaphrams 1 5/8

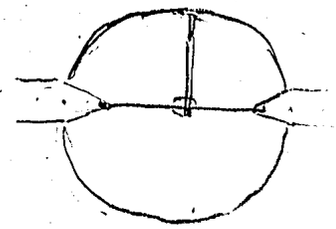
Compare with 3/4 opening Holder

① 4-1-1-1-1 mica

② 4-1-1-1 "

#1 is best - loudest tone about Sam

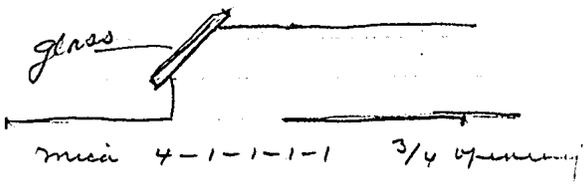
Short wire 1" long 134



Above built same as standard page 69 but without posts

This 4-1-1-1-1 mica, same was louder than standard.

They tried with post 1/2" apart result very much with Posts



Comparisons

1 standard page 71 - mica 4-1-1-1

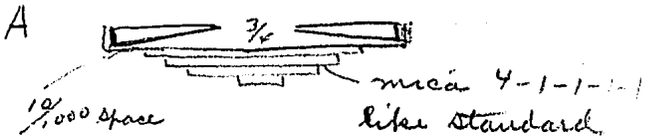
2. 4-1-1-1 mica, balance like standard

3 glass reflector as above.

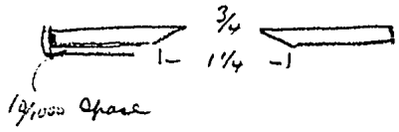
	loud	low
1	70	70
2	80	80
3	90 -	90

This is loudest recorder to date does not make any difference on old 5/16 opening, but when you have a big surface - below 3/4 opening results are different

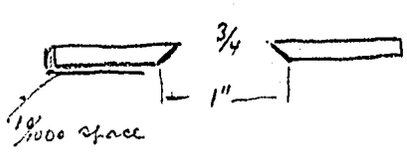
A



B



C

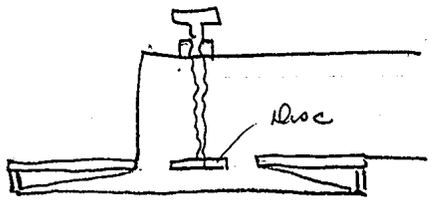


X

Compared the above air spaces

	loud	tone
A	70	70
B	65	70
C	63	70

July 27, 20

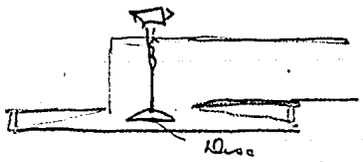


		loud	time
A.	3/8 disc flush with Holder.	70	70
B	3/8 disc 6 turns closer about 13/1000 from diaphram	72.	72
C	no disc	72	75
D	1/4 in disc flush with Holder	70.	70
E	1/4 disc 6 turns closer about 15/1000 away from diaphram	72	72
F	no disc	71.	72

B is louder than E.

Tried 3/8 disc different distances from 1 to .005 is best (This is Good)

See page 141



	Loud	Tone
A 3/8 - .005 away	70	70
B - 1/2 - .005 away	72	72
C - 1/2" - .014 away	71	- 72

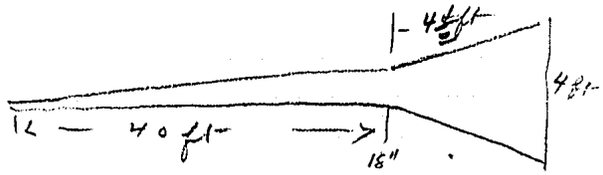
1/2 at .005 away seems best but varies say 3/8 is.

Compared loudest recorder to date

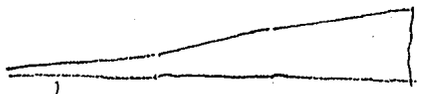
Reflector page 135.	70	70
Reflector Recorder with 3/8 disc .005 away X	72 -	65
Standard Recorder	65 -	65

loudest to date

A



B



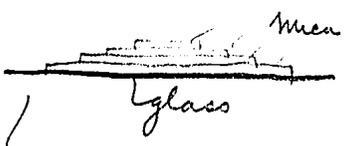
Horn #4 page 21 without flare

B is louder at 2 ft + same loudness as A at 8 ft

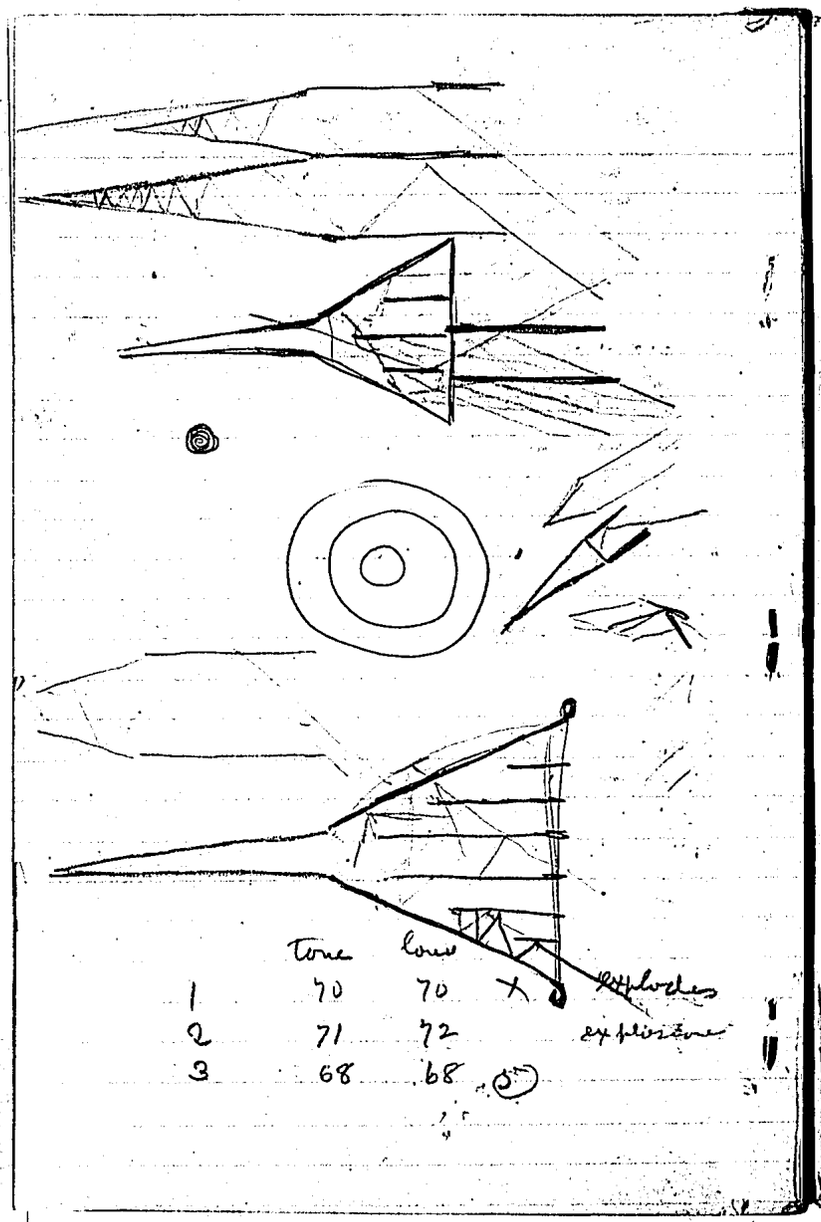
A is in all cases is muffled
tests tried with soprano,
both blasted easily

Glass Diaphragm 15/8

thin tone – not good



louder + fuller than standard
page 135 #3



	Tone	Loud	
1	70	70	X
2	71	72	
3	68	68	

explosive

Standard Recorders

	Loud	Tone	Roughness
1 much 4-1-1-1-1	70	70	70
2 much 4-1-1-1-1	80	71	75
3 gents 4-1-1-1-1	Werner Exper 75 X	68	78-?
4 short wave 4-1-1-1-1	71	71	72
5 reflection 4-1-1-1-1	90	90	
5F			

[ITEM(S) FOUND IN BOOK]

Dec/ 29, 1919.

Mr. W.T.Miller

Attached find Mr. Edison's comments on the last records (23 & 24) made in the Columbia St. Studio. When you have finished with them kindly return so that we may file with the previous ones.

You will note that he desires to have the regular 3/8 opening tried (which he calls 3/8") and also another trial made with the 1/2" opening when the air chamber has been lessened.

Would suggest you have Frank make up the steep 12" end pulce for the regular opening, also a regular recorder form to which diaphragm can be transferred, then we can give him sample of 1/2" against regular using same diaphragm/ as we did with the 5/3" against the 1/2".

Kindly let me hear from you regarding the above so that I may tell Mr. E. it is under way.

Geo. J. Werner.

per F.C.Burt.

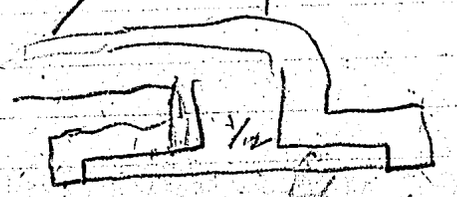
(13)

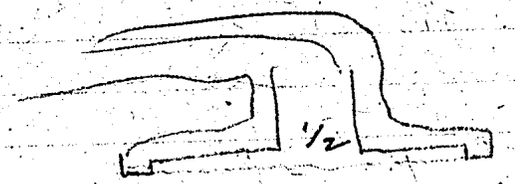
[ITEM(S) FOUND IN BOOK]

DEC 29 1919

Werner

Please dimensions the chamber on the 1/2 Chemney work



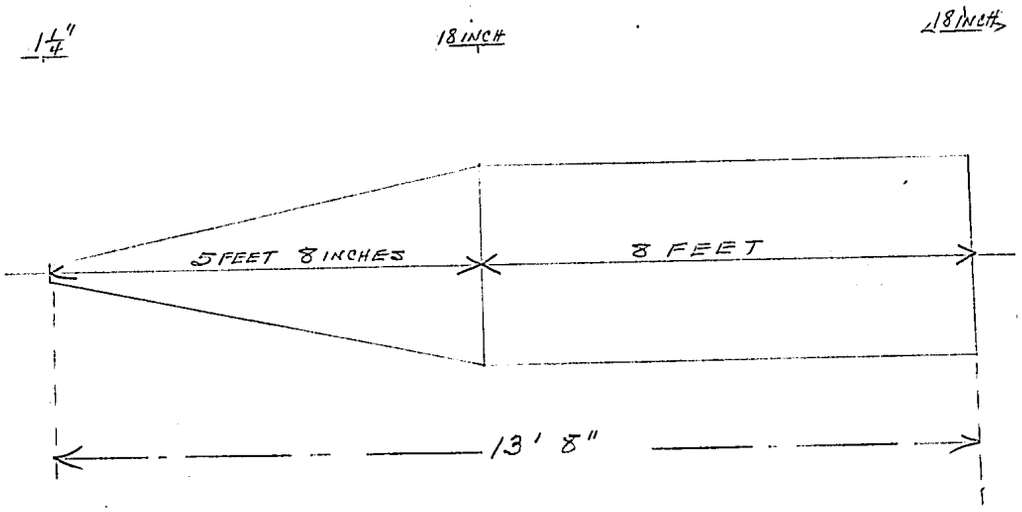


Chamber

& take measurements record

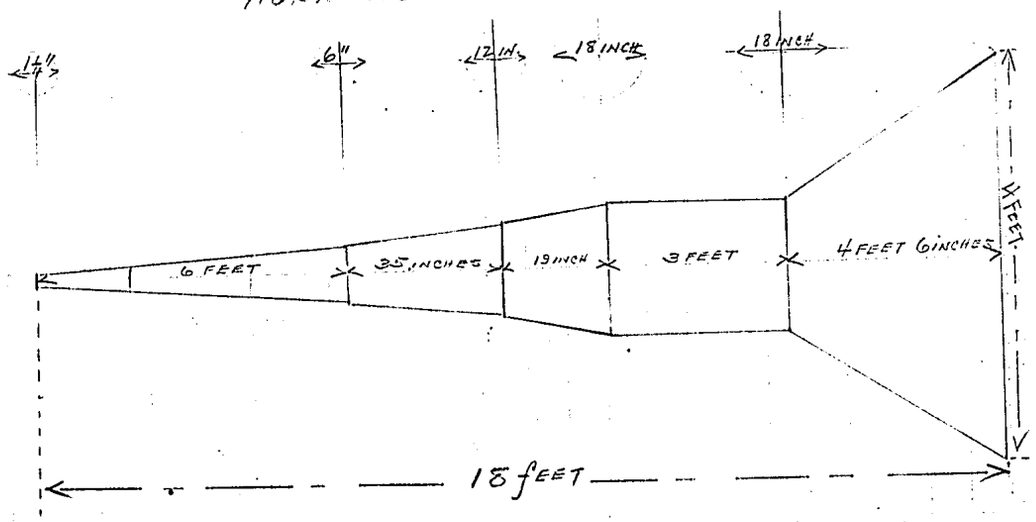
[ITEM(S) FOUND IN BOOK]

HORN NO. 3 IS



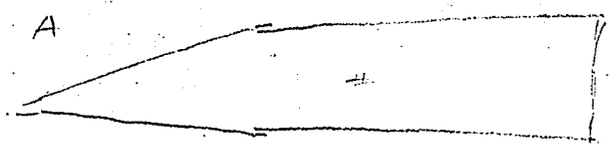
JUL 3 - 1920

HORN NO. 4 IS

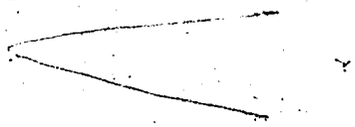


[ITEM(S) FOUND IN BOOK]

A



B



1. A - 2 ft away
   B - 2 ft "

2. A - 4 away
   B - 4 away

3. A - 6 "
   B - 6 "

[ITEM(S) FOUND IN BOOK]

Trials # 13 Jan 27/21

Lauter Piano 5½ ft. open

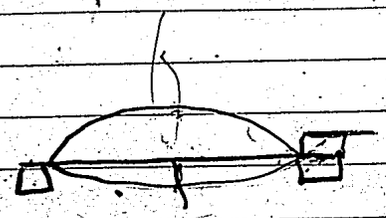
Recorder #1.

with Prussard hafer. 8-11-12-14-15

1st Trial — Fia. Free
Cant hear tracking but its weak
Recording

2d " Just hear tracking with Wire
Record 50% Louder & OK

3rd " 40% Louder than with Clay at end of Arm.
Just hear tracking
but tracking weaker
than 2 " " blubbs tightened more.



Brady